

VOL. 83 No. 2118
FEBRUARY 13 1960

Telephone: FLEet Street 3212 (26 lines)
Telegrams: Benformula - Cent - London

Editor Manager
M. C. HYDE R. C. BENNETT
Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street,
Birmingham. [Midland 0784-5]

Leeds Office
Permanent House, The Headrow,
Leeds 1. [Leeds 22601]

Scottish Office
116 Hope Street, Glasgow C2.
[Central 3954-5]

IN THIS ISSUE

Project News	279
Polythene 'Know-how' for Poland?	279
Distillates	280
Emulsion Terminology Criticised	281
Letters to the Editor	282
Rubbers for L.T. Service	282
Communist-bloc Embargo List	283
C.J.B. and Fluid Bed Gasifier	284
Mitchells to Produce Chempump	285
U.S. Naphthalene Trends	286
Overseas News	287
U.S. Tranquilliser Probe	289
Chemist's Bookshelf	290
People in the News	294
Commercial News	296
Trade Notes	298
Market Reports	298
Diary Dates	298
New Patents	300

Annual subscription is: home, 52s 6d,
overseas, 60s, single copies 1s 6d (by
post 1s 9d)

CHEMICAL AGE

BOUVERIE HOUSE • 154 FLEET STREET • LONDON • EC4

DRUGS UNDER ATTACK

THE Poisons Board has recommended that some 25 substances including Preludin (the slimming drug produced by Pfizer Ltd.), tranquillisers, stimulants and sex hormones should be supplied only on prescription. This was announced last Thursday by the Home Secretary, Mr. R. A. Butler. Subject to the representations of those concerned, Mr. Butler proposes to accept the Poisons Board's recommendations and to give it effect as soon as practicable.

For some years now the Pharmaceutical Society has been concerned at the over-the-counter sale of these drugs and has long wished to see them available only 'on prescription'. This view is shared by the medical profession in this country. In their opinion the recommendation made above has been long delayed and they would welcome an early decision to place such drugs under a certain amount of control. Preludin has for some time been a notorious example of a drug which, although most useful when given under medical control, has been grossly abused as a result of being freely available to the public. The manufacturers of this drug have also stated that they would welcome the restriction of sales, i.e. on doctors' prescriptions.

Writing in the *British Medical Journal* recently (26 December, p. 1482), Drs. P. Dally and W. Sargant, St. Thomas's Hospital, London, drew attention to a "potentially dangerous situation that is now arising with the introduction and widespread advertising of a whole range of non-antidepressant drugs." Nialamide, for example, can cause a marked and dangerous increase of anxiety in certain types of depression. Some patients who do not improve under treatment become serious suicidal risks, and these doctors consider that more suicides will occur if doctors accept claims that such drugs can replace electroconvulsion therapy.

These days it is very difficult to decide which drugs should be left out of the Poisons List. Some authorities consider that legislation for the control of drugs should be separated from that dealing with foods and from that dealing with agricultural and industrial poisonings. It has been suggested that all new drugs should be subject to control until proved safe for general distribution; this would be welcomed by pharmacists and medical practitioners. There have been cases of drugs being introduced into general use before their chronic toxicity was fully known but, fortunately, this is less likely to happen in the U.K. than in a number of other countries.

One difficulty to which careful consideration has and is still being given, is the definition of 'drug'. The present definition in the Sale of Food and Drugs Act does not include drugs used in veterinary medicine, for instance.

A recent article (*Sphere*, 16 January) after describing the fairly steady pressure of criticism, informed and otherwise, under which one of Britain's most important "science-based businesses", pharmaceutical manufacturing and trading, had to operate, stated, very rightly, that this exposed situation was unmatched in any other private industry. We might add to that, however, the production of agricultural chemicals and pesticides.

Any industry immediately concerned with people's health and welfare is inevitably a target for criticism. The pharmaceutical industry has at all times to deal with preparations that in certain circumstances could be poisonous or habit-forming. Constant public concern, and regulations by the

Government, the *Sphere* indicates, are perfectly reasonable, but they still constitute special circumstances in which to carry on any business. Certainly it is true that this industry and the agricultural chemicals and pesticides industries have had more adverse publicity than any others. A recent example which puts the pharmaceutical chemist in the worst possible light was that of a widely read national newspaper which, while reporting the Council of the Pharmaceutical Society's advice on the sale of drugs, acting on the Central Nervous System (C.N.S.) at the same time carried a cartoon showing a "reliable chemist" selling such a product and giving with it a free gift of a monkey labelled "Peril of Addiction".

There seems to be a tendency to pay too much credence to alleged cases of drug addiction and its proportions and to cases of poisoning resulting from application of agricultural chemicals and pesticides (see *CHEMICAL AGE*, 23 January, p. 159). As has been pointed out, to some extent there has been a failure to recognise adequately the hysterical scares spread by the more sensational sections of the national press and other irresponsible bodies. Also opportunist advantage has been taken of this hysteria by plausible counsel as an excuse in defence of law breakers. Give a drug a bad name and a case can be made out that could make today's approved remedy appear to be tomorrow's dangerous drug. Some of these difficulties can be overcome, however, by more thorough testing of drugs before marketing.

Attention has also been drawn in the last few days to the short fall in savings expected by the Ministry of Health from operation of the voluntary price regulation scheme agreed with the Association of British Pharmaceutical Industry. An appraisal of the scheme is now being made by an interdepartmental working party. The A.B.P.I., however, have now issued a statement regarding the Comptroller and Auditor General's report on the Civil Appropriation Accounts 1958-1959, in which they state that the comparatively small savings resulting from it (£412,000 on an annual expenditure of £28 million) confirms the industry's view that prices generally were fair.

One main reason why the expected savings were not realised, A.B.P.I. say, is that increased exports enabled a number of products to satisfy the test of reasonableness by reference to their prices overseas. Drug exports in 1959 reached a record total of £40.1 million. Indeed the M.O.H. has stated that for products exported to a significant extent the scheme has demonstrated that National Health Service prices are generally lower than the average prices in the main export markets.

In his report, the Comptroller also commented on the high profit rates in terms of capital employed that are apparently being earned by British subsidiaries of U.S. companies. As the A.B.P.I. statement notes, for a valid comparison to be made between the profits of companies based in Britain and those which are subsidiaries of U.S. companies, account should be taken of the large sums of capital employed on research and technical development by the parent companies in the U.S., "from which the Health Service in the U.K. derives immense benefit".

NEW COATING MATERIALS

P**PROMISING** film-forming materials that adhere well to metals have been made from soya bean and linseed oils by chemists of the U.S. Department of Agriculture at Peoria, Illinois. The films are stated to be flexible, to withstand heat, and to resist abrasion, alkalis, acid, and such solvents as alcohols, mineral oil, and benzene—all properties needed in metal coatings. These properties also suggest soya bean- and linseed-oil films for adhesives and concrete and masonry paint.

Research that led to these oil derivatives, called vinyl

ethers, was carried out at the ARS Northern Utilisation Research and Development Division at Peoria as part of the overall evaluation of agricultural commodities as sources of metal coatings. Chemists H. M. Teeter, L. E. Gast, and J. C. Cowan, chief of the oilseed crops laboratory, directed the work.

Although vinyl ether films are still in the laboratory stage of development, these workers have demonstrated that these films adhere especially well to black iron and aluminium. Discs stamped from metal covered with the films were formed into lids or ends and crimped into place on can bodies without breaks in the films.

To make the new film materials, the Department of Agriculture chemists reacted fatty alcohols—commercially produced from soya bean and linseed oils by chemical reduction with sodium—with welding-grade acetylene to produce vinyl ethers. The molecules of the vinyl ethers were joined together by polymerisation to produce giant molecules, which make up the film-forming materials.

The vinyl-ether polymers and copolymers are colourless to pale yellow viscous liquids that cure by baking or air drying to form almost colourless to amber films.

U.S. TRANQUILLISERS PROBED

T**O** meet Senator Kefauver's Senate subcommittee investigating tranquilliser prices and advertisements, U.S. tranquilliser manufacturers prepared a vigorous defence. They cited the therapeutic achievements with the use of tranquillisers, competition within the industry, and costs of research, development, testing and introduction of such products. (See p. 289.)

Underlying the use of tranquillisers in present-day medical practice are the forecasted sales for 1960 of these drugs—\$150 million. Another \$20 million, it is estimated, will result from sales of these same chemicals, specially formulated for use in the treatment of conditions ranging from cardiovascular disease to acute vomiting in uraemia. The total, it is indicated, will account for nearly 10% of the country's total ethical drug market at the retail level. Some 70 companies market this type of product, for which nearly 100 trade names are listed.

In the years 1953 to 1956, sales of the main tranquilliser drugs rose to over \$100 million and for 1958 totalled \$128 million. Kefauver's subcommittee suggests that for 1959 tranquilliser sales reached almost \$200 million, although the U.S. pharmaceutical industry consider that this estimate is high. Leading tranquillisers in the U.S. were Smith Kline and French's Thorazine and Compazine, Squibb's Prolixon (fluphenazine), Warner-Chilcott's Pacatal (mepazine), Wyeth Laboratories Division, American Home Products Sparine (promazine) and Schering's Trilofon (perphenazine). Also on sale under a variety of trade names is Reserpine. Others making good sales for milder conditions were Miltown (Wallace Laboratories of Carter Products Inc., Equanil (Wyeth) and Atarax (hydroxyzine) from Pfizer.

It is in the sales of the last three mentioned products that competition is keenest.

Manufacturers of tranquillisers realise that there is no stable market for this type of drug. Since the introduction of the first—Thorazine in 1955—the list of tranquillising drugs has been growing, to reach almost 100 in 1959. Research costs on new drugs are high, too. S.K.F. report that they spent \$3.5 million in laboratory work on 15 tranquilliser projects and cost of clinical trials came to \$1.7 million in 1959.

To a certain degree tranquillisers are accepted as a standard treatment for mental disorders, but the signs suggest that sales and new types of compound will tend to level out from now onwards. Any gains to be made will depend on population patterns, and mental institution's budgets.

Project News

Exclusive Licence on Scrubbers for U.K. Chemico

● A recent agreement with their U.S. parent company enables Chemical Construction (G.B.) Ltd., 9 Henrietta Place, London W.1, to undertake P-A (Pease-Anthony) venturi and cyclonic scrubber work in the U.K. and the Commonwealth countries on an exclusive basis. Inquiries for this type of gas cleaning equipment should now be addressed to the London company.

● REGENT OIL CO. have awarded a contract for the design, purchase of materials and construction of their new oil storage installation at Cardiff to Constructors John Brown Ltd., Eastbourne Terrace, London W.2, excluding the supply and erection of the oil tanks which are the subject of a separate contract. This new installation will have tanker off-loading facilities and loading facilities for rail, road and coastal traffic for both black and white oils.

Work on the installation starts immediately and completion is anticipated before the end of the year.

● Orders worth more than £250,000 have been received by Ashmore, Benson, Pease and Co. Ltd., a member of the Power-Gas Group, Stockton-on-Tees, from Petroleos Mexicanos, through Fluor Engineering and Construction Co., for fabricated refinery equipment. The equipment, which is for the Minatitlan refinery, near Vera Cruz, Mexico, includes over 70 heat exchangers and two large vessels.

The vessels are 12 ft. 0 in. diameter and 214 ft. 0 in. long. Due to transport considerations each vessel will be despatched from the company's South Works at Stockton in four sections, one vessel being finally shipped in sections, while the sections of the other will be welded on the dockside at Birkenhead prior to shipment in one piece.

Oil Equipment Mission to Argentina

A FOUR-MAN mission has been set up by the Council of British Manufacturers of Petroleum Equipment to visit the Argentine to introduce the potentialities of the U.K. oil equipment industry to Y.P.F. and the oil companies there. It will also study the opportunities for U.K. capital goods and discuss the possibilities of credit facilities if these are required.

The mission will consist of Mr. E. F. E. Howard (Hayward, Tyler and Co. Ltd.), past chairman of the council and chairman of British Oil Equipment Credits Ltd.; Mr. L. S. Dawson (Oil Well Engineering Co. Ltd.), a member of the council's committee and a director of B.O.E.C.; Mr. Gordon Goodrich (sales manager, Oil Division of Stewarts and Lloyds Ltd.); Mr. D. S. Barwell (resident representative in Trinidad for Newman, Hender and Co. Ltd., B.K.L. Alloys Ltd. and Kirk and Co. (Tubes) Ltd.).

Closer I.C.I. Link with Poland May Include Polythene Deal

BACK from his visit to Warsaw, Mr. S. P. Chambers, chairman-designate of Imperial Chemical Industries Ltd., reveals that I.C.I. envisage closer links with Poland to their "mutual advantage". Plans have been discussed, he announces, between the Polish Government, industrial leaders and himself to buy I.C.I.'s



S. P. Chambers, who returned from a visit to Warsaw last week-end

know-how on polythene production and a big contract—above £1 million—for the supply of polythene manufacturing

plant with a consortium of East European Communist Governments headed by Poland.

So far, in addition to Poland, with whom I.C.I. have the closest commercial relations, East Germany, Czechoslovakia and Roumania were interested. Discussions will soon take place in London.

Last autumn, I.C.I. signed an £8 million contract with Poland for the supply of Terylene fibre, and long-term provision of 'know-how', including technical improvements and inventions. A much smaller Terylene contract was recently concluded with Czechoslovakia.

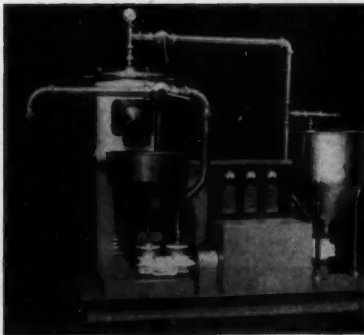
Polish chemical industry is "very anxious" to link up with I.C.I., Mr. Chambers states. The Poles are "bothered" about the advance of West Germany's chemical manufacturing industry. He considers the relationship holds "considerable mutual advantages," instancing the possible I.C.I. marketing of certain Polish heavy chemicals.

Premier Colloid Form Company to Handle Packaged Chemical Plants

SUCCESS with the marketing of 'packaged chemical plants' in the past few years has led Premier Colloid Mills Ltd., Hersham Trading Estate, Walton-on-Thames, to form Chemical Engineering Premier Ltd. to handle the development and sale of packaged plants.

The company adopted the principle embodied in packaged steam raising plants, which need no installation except for the connection of oil, water and electric supplies, a few years ago in the design and construction of small chemical plants involving the use of colloid mills; a number of specialised plants have been sold for the production of dispersions and emulsions. Units recently built cover plants for the manufacture of soap-based and bentone greases, paraffin wax emulsions, paint, etc.

Such plants generally consist of premixing vessels with mixers, mills, pumps, finished product tanks, all mounted on a common baseplate. Water and steam pipework is built-in, as is electrical wiring.



Grease milling and de-aerating 'packaged' unit

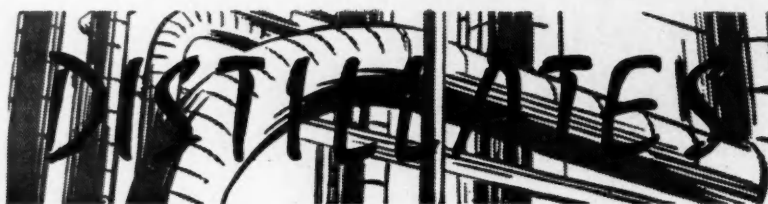
These services are then taken to one central point for connection to external services. Added advantages claimed for this method of construction are that the first cost virtually covers the complete capital outlay since no hidden extras are involved in assembling the plant and the installation of such plants in underdeveloped countries overseas, has many advantages.

I.C.I. Introduce New Propylene Oxides/Glycols

Now in commercial production at Imperial Chemical Industries' Tees-side petrochemical facilities are propylene oxide and propylene glycol, while commissioning of the new Propathene plant in late 1960 will add a third new use for propylene.

Recent extension of propylene capacity at Wilton to over 80,000 tons a year has made these developments possible, and I.C.I. have been able to implement plans not only for these new products, but also for making additional feedstock available for existing propylene derivatives, namely, isopropyl alcohol, acetone, and normal- and iso-butanols.

It is intended that propylene oxide and propylene glycol will be supplied to industry at large, as well as within I.C.I. Both materials have extensive applications, but the principal use of the oxide is as an intermediate in the production of polymethane foams, and that of the glycol in polyester resin manufacture. End uses of these latter resins, when laminated with glass fibre or other reinforcing materials, are in the fabrication of car bodies and a variety of other finished products.



★ MY REPORT two weeks ago of rumours about a clash of interests over a South Germany refinery project (Distillates, 30 January) was timely. Last week national newspapers were writing about a "major battle for the supply of petroleum products to Germany".

The South Bavarian Government denied rumours that E.N.I. were getting preferential consideration in the proposals for a refinery. Now the Italian plan to build a pipeline from Genoa to Switzerland and Germany via the new St. Bernard Pass Tunnel is being challenged by Shell's decision in principle to build a refinery in Bavaria and to supply it with crude oil by pipeline from the south.

E.N.I. plan a refinery at Aigle which would meet two-thirds of all Switzerland's needs for petroleum products. From Aigle the pipeline was to continue to the Swiss-German border where it would branch into two streams, one to the Ruhr and the other to Bavaria. A large refinery and a petrochemical plant were scheduled for the pipeline terminals in Germany.

Apart from Shell's plans, two other projects threaten the E.N.I. plan. The first is the Venice-Munich pipeline planned by the major oil companies and the other the planned extension to Munich of the Karlsruhe pipeline.

★ NOVEL stand of Albright and Wilson (Mfg.) at the 1960 Ideal Home Exhibition will feature a larger-than-life-size water sprite. The sprite, with long flowing silky hair, has been devised, I am told, to carry on the sales theme for Calgon, Albright and Wilson's simple and effective method of softening water for household or toilet purposes. Calgon will be demonstrated on the stand and sample packs will be available from supermarket-style self-service baskets.

The A. and W. stand will also feature Micromet, a slowly soluble form of sodium metaphosphate, recently introduced to the domestic market, after having been used for some time by industry and in hospitals. In an easy-to-use polythene basket, designed to be placed in domestic cold water tanks, Micromet crystals are claimed to be the first cheap and simple answer to scale formation in domestic boiler water, wherever hard water is found, and to 'red water'.

★ TONNAGE oxygen plants are being transported in a near assembled state for the first time. Two plants, each of which will produce 100 tons of oxygen a day, are being moved this week by road from the North London works of British Oxygen Engineering Ltd., to the Scottish Gas Board's site at Westfield in Fifeshire, where they will play an es-

sential part in the production of town gas by the Lurgi process. I am told that these oxygen plants are the first of a new type, but that no details are yet available for publication.

Transport of the two oxygen plants in a virtually assembled state will save many manhours in erection time compared with conventional plants, which are erected wholly on site. To achieve this saving, however, major transport problems had to be solved. The project has already involved manoeuvring such parts as two 24-ton air separation units—which are 35 ft. in length and 12 ft. in diameter—on to trailers, while the opposite problem will have to be overcome at the Westfield site.

★ IT APPEARS that one of Sir Alexander Fleck's main interests in his retirement—he is resigning the chairmanship of I.C.I. shortly—will be in the educational field. Last week, with the support of Sir David Eccles, Minister of Education, he launched an appeal to industry to help in the setting-up of a staff college for senior teachers in colleges of technology and commerce and senior industrial staff. (See picture, p. 283.)

Sir Alexander is asking industrial and commercial firms to contribute £100,000 as a single, once-and-for-all contribution. Already £60,000 has been promised after private approaches to 30 firms. The running costs, amounting to about £30,000 a year would be paid mainly from public funds.

The college is intended to be a small one offering a series of short courses of two to four weeks throughout the year. It is hoped that the first will start before the end of 1961. The numbers attending each course would be about 30. Sir Alexander who considers the scheme "to be of the greatest possible importance and promise", thinks that co-operation between industrial and commercial firms on the one hand, and the public education system on the other is essential for the teaching of advanced technology.

★ THE \$50 million development project of Celgar Ltd. on the bank of the Columbia River, near Castlegar, British Columbia, which will have a designed capacity of 500 tons of bleached kraft pulp a day and 65 million board feet of lumber a year, is on construction schedule. If progress is maintained it will be operating this year.

I learn that the main purpose of the new \$2.6 million alkali-chlorine plant that Consolidated Mining and Smelting Co. of Canada have started building at Trail, B.C., will be to provide the liquid chlorine and caustic soda required by the

new Celgar mill. The Trail plant, which will also produce potassium hydroxide, is also scheduled for completion before the end of this year.

★ RECENTLY CHEMICAL AGE carried a leader on U.S. chemical companies' activities on the Continent, particularly with regard to mergers with European chemical concerns (26 December, p. 923). At that time it was indicated that the Continent as a whole was offering facilities and tax lures to encourage the setting up of new plants. I now see that Mr. Reginald Maudling, Board of Trade President, in Parliament on Tuesday, reported that a new drive was being launched by the Government to attract U.S. investment in the establishment of new business enterprises in the U.K.

To this end the Government are to set up an industrial development office which will be established in New York. A senior B.o.T. official will take charge of the office, and is expected to arrive in New York on Friday week. The staff, I see, will include Ulster officials.

★ ONE of the newest S.C.I. groups, that for surface activity, has arranged a most interesting series of papers for the next few months. To be given by eminent specialists these should help raise considerably the present membership figure above the correct level of about 180, of which half are overseas.

The January meeting heard a stimulating address in which Dr. Sumner of the British Standards Institution criticised emulsification terminology (see p. 281). This month, on 29 February, Dr. E. G. Cockbain will talk on the 'Colloidal stability of natural rubber latex'.

Readers of this page who would like further details and membership forms should write either to Mr. M. K. Schwitzer, hon. secretary, at the Chemical Division, Armour and Co. Ltd., 4 Chiswell Street, London E.C.1, or to Mr. F. Riley, hon. recorder, Marchon Products Ltd., 140 Park Lane, London W.1.

★ BACON and chemicals might seem to be unconnected, but not according to Mr. S. P. Chambers, I.C.I.'s next chairman. On their relationship may hinge prospects of a big trade in chemicals. Leaders of Poland's State chemical industry are particularly keen to link up with I.C.I.—buying polythene 'know-how' and plant, and marketing heavy chemicals through I.C.I. (See p. 279.)

But the niggler-in-the-woodpile is the recent U.K. cut in the Polish bacon quota, which has upset the Poles, although they did not mention this matter in connection with prospects for chemical trade. The amount of bacon at stake is a relatively small matter for the U.K., says Mr. Chambers, but it means a great deal to Polish trade. He is to do everything possible to urge reconsideration of the bacon policy in relation to Poland.

Alembic

EMULSION TERMINOLOGY CRITICISED

Indiscriminate Use Discussed at S.C.I.

Meeting by B.S.I.'s Dr. C. G. Sumner

PRESENT indiscriminate application of the term 'emulsion' to systems made by emulsification, irrespective of whether or not both phases were liquid in the final product was discussed at a joint meeting of the Surface Activity and the Oils and Fat Groups of the Society of Chemical Industry in London on 11 January, by Dr. C. G. Sumner of the British Standards Institution in a paper on 'Emulsions in theory and practice.' Development of emulsion technology was outlined and Dr. Sumner pointed out that the theoretical advances which had had the most impact on technical progress were all concerned with emulsifying agents. Outstanding among these was the development of synthetic surface-active agents as a result of the theory of molecular orientation at interfaces.

Because of this background, emulsion theory had become concentrated on the properties of the interfacial film as such, and the influence of the film on the mutual relations between film-covered droplets in an emulsion had received comparatively little attention. Three main problems had to be considered in this connection: How the nature of the emulsifying film determined the phase relationship in the emulsion; how the film enabled the droplets to persist without coalescence; how the film influenced the bulk properties of the emulsion, e.g., the state of aggregation and the flow properties.

Mechanism Uncertain

Phase relationship was due to the selective action of the film in opposing the recoalescence of droplets of one liquid but not of the other; the mechanism of this selective action was still uncertain. Persistence of the droplets after formation of the emulsion was an allied problem, and it was not yet known how far this depended on the maintenance of a layer of continuous phase between droplets even on close approach. Flocculation in oil-in-water emulsions could occur if the concentration of emulsifying agent was either too low or too high, or if the agent was insufficiently hydrophilic when adsorbed at the interface. Viscosity of the emulsion was increased by flocculation, but another possible factor in the flow of concentrated emulsions was the effect of the interfacial viscosity or rigidity of the film in opposing distortion of the droplets.

A discussion on Dr. Sumner's paper was opened by Sir Eric Rideal, chairman of the Surface Activity Group, who presided at the meeting.

Dr. Sumner had referred to Dr. Lawrence's remarks on how little was

known about emulsions, said Dr. T. Malkin. Of course, a good deal was known but the variables were so great that it was unlikely that any simple theory would embrace all the phenomena. If, for example, coalescence of two oil drops in an oil/water emulsion was considered, they had first to overcome the electrical double layer and make contact; then as the point of contact broadened into an area, the surface active agent at the junction of the drops had to move either into the oil or into the aqueous phase as the original two surfaces merge. The facility of this process would depend on the size, shape, and character of the hydrophobic group and the polarity, shape and hydrogen bonding power of the hydrophilic group. The precise part played by each was a difficult problem in itself.

A Complicated Phenomenon

The fact that the coalescence of droplets in an emulsion was a complicated phenomenon had been insufficiently realised in the past Dr. Sumner agreed, and one of his main objects in the paper had been to stimulate interest in this and other neglected aspects of emulsion behaviour.

Mr. E. M. Learmonth suggested that Dr. Sumner's discussion seemed to imply that the oriented molecules at the interface were static and even bound in a rigid structure. He had spoken, for example, of "rupture of film". This picture was rather differently painted by the chairman some years ago, discussing the orientation of grease films in connection with detergency. There it seemed that the oriented molecules might individually reverse their orientation and the frequency with which this occurred was a function of their free energy. Was not this a more likely picture, and could it not be utilised to classify at least the simpler types of long chain molecules whose energy characteristics, especially in homologous series, were perhaps known by now in fields quite outside that of emulsion technology?

If these speculations have any basis one might be able to predict the relative likelihood of coalescence of droplets stabilised by members of homologous series and extend the data to bring in other factors such as the degree of solvation of polar groups and so forth. Was sufficient data available for this sort of consideration? asked Mr. Learmonth.

From Dr. Sumner's discussion of protein stabilisers too, he had gained the impression of a rigid mechanical structure. Was it not possible here also that a degree of movement was occurring all

the time? At least in the aqueous phase it might be supposed that protein molecules were capable of a good deal of relative motion, related for example to their degree of hydration and to the varying strength of their ionic charges on which data was surely accumulating by now.

That the molecules in interfacial films were not static was generally recognised stated Dr. Sumner, but was hardly likely to affect the arguments discussed in the paper. The kinetic approach suggested by Mr. Learmonth did not differ fundamentally from the calculation of HLB numbers by J. T. Davies. Dr. Sumner's reference to rigid protein films was to the condensed, three-dimensional thick films which were readily built up from protein monolayers, and did not imply that the individual molecules were static.

The presence of a 'third' layer of materials at the interface between two immiscible liquids which had been emulsified, was of considerable interest, thought Dr. R. H. Marriott. Experimental work had been carried out in his laboratory to measure the dimensions of this film and the evidence so far obtained in the case of an emulsion of water-in-oil made with white oil, beeswax and a mild alkali suggested that this third state behaved as though it were somewhat crystalline (or orientated) and was of the order of eight molecule lengths in thickness. Bearing in mind the molecular length of the esters in beeswax, this was of significant magnitude. His view was that the presence of such a boundary virtually increased the volume of the dispersed phase so that the emulsion possessed properties which could be looked upon as pseudo-thixotropic.

Work on Wax Dispersions

Some work on wax dispersions which Dr. Sumner carried out many years ago had indicated, he said, that the emulsifying agent formed by beeswax and alkalis was different in character from an ordinary soap, and the experiments described by Dr. Marriott were of great interest. The transfer of liquid from a droplet by molecular diffusion through the emulsifying film was doubtless a factor to be taken into account in the coalescence of droplets.

There was a tendency among workers in emulsion chemistry, said Mr. E. D. Gilbert, to treat the interfacial film as if it were a fixed, unchangeable structure, once it was formed. This was wrong. The interfacial film was in equilibrium with both phases, and changes in the composition of either phase would modify its structure, and so affect the stability of an emulsion. The effect of temperature on emulsion stability could be explained in the same way. Simple experiments in the solu-

(Continued in p. 290)

Letters to the Editor

Free Information Service for Research and Industry

SIR,—We have in our library here a very full collection of data, in the form of a comprehensive card index system classified under the following headings, and would be very glad to provide the information contained in these cards as a free service to research and industry to bona fide inquirers.

Acetyl acetone	Fluorine organics
Adrenalin	Furans
Alcohol & alcohols	Formaldehyde
Alkaloids	Glycerol
Alkyl halides	Hypnotics
Amines, guanidines, ureas & thioureas	Insulin
Amidines	Insecticides, pesticides & fungicides
Amino alcohols & amino ketones	Khellin
Aminobenzoates	Krillium
Anaesthetics	Levulinic acid
Analgesics	Maleic anhydride
Antabuse	Mercury organics
Anthelmintics	Steroids
Antibiotics	Nitrofurazone
Anticoagulants	Organotin
Antihistaminics	Plant hormones
Antimony compounds, organic	Pyridines
Antimalarials	Pyrimidines
Antiseptics	Polyvinylpyrrolidone
Antispasmodics	Proteins & amino acids
Antithyroid compounds	Phenurone
Arsenic compounds, organic	Phosphoric organics
Avertin	Phthalic anhydride
Barbiturates	Phenol
Boron organics	Phenanthridines
Bismuth compounds	Polymers, high, & certain plastics
Benzimidazoles	Quaternary ammonium salts
Benzyl compounds	Quinoxalines
Cellulose & derivatives	Silicon organics
Chloral	Sequestering agents
Chloroform	Solvents
Curare-like compounds	Sulphonamides, sulphones
Carcinogenic & anti-carcinogenic compounds	Spasmolytics
Dextran	Tetra alkyl ammonium salts
Ethanolamines	Tropolones
Essential oils	Tranquillisers
Flavines	T.B. drugs, anti
	Vitamins
	X-ray contrast media

The information is taken from published literature, scientific and technical journals, various abstracts, etc., over the past 12 years and covers the U.K., U.S., and Canada, and most European countries; it is frequently augmented from our own research and inquiries.

Emphasis is on the chemistry, preparation and manufacture and economics of fine chemicals, medicinal products and the like with cross reference to biological matters where appropriate.

Yours etc.,
M. A. PHILLIPS.

Dr. M. A. Phillips and Associates,
9 Western Road,
Romford.

No B. and K. Instrument Exhibition this Year

SIR,—For the last five years we have organised the annual International Instrument Show. This show has become so much a part of the calendar that we are now busy disappointing would-be visitors who assume that 1960 will see the sixth in the series.

To appreciate the reason why there is no I.I.S. this year, it is necessary to recap on its origin. The idea was conceived in 1955 when all of the then existing 'big shows' were national rather than international. However, this year there is certainly no reason why any British engineer should not compare products from overseas in at least one British show.

B. and K. Laboratories Ltd. are not exhibition organisers and we hope that specialists in this field will continue the trend towards larger and better international exhibitions and free us to serve in other ways.

Yours etc.,
C. J. MITCHELL,
Technical Director.

B. and K. Laboratories Ltd.,
4 Tilney Street,
London W.1.

New Research Work on Compounding Rubbers for Low Temperature Service

RECENT investigative work at the British Rubber Producers' Research Association has extended the temperature range at which natural rubber will perform effectively and brought many new applications within its scope.

This work, by S. G. Fogg and P. M. Swift, is published in B.R.P.R.A.'s Bulletin No. 4 'Compounding Natural Rubber for Service at Low Temperatures'. Bulletin No. 3 showed how the upper temperature limit can be raised to 125°C; the latest bulletin explains how, by the use of plasticisers and by chemical modification of the rubber, the lower limit for effective utilisation can be brought down to at least -60°C. These cold-resistant compounds are stated to be suitable for numerous products, e.g. window seals, tank tracks, in the Polar regions, in deep-freeze equipment, etc.

The natural rubber compounds developed for improved service over a wide range of sub-zero temperatures are based on the incorporation of plasticisers which serve substantially to counteract the rapid stiffening that occurs at low temperatures; and on chemical modification of the rubber which results in marked retardation in the slow progressive stiffening that also takes place at low temperatures.

Under the heading 'glass hardening' Fogg and Swift state that the temperature at which glass hardening occurs (-60°C) can be reduced as much as 20°C by incorporating plasticisers. Long chain aliphatic esters, such as di-isooctyl sebacate (DOS) have generally been found to be the most suitable.

Under the heading 'crystallisation' it is stated how modification to retard the

Fisons Explore Production Prospects in Mexico

EARLIER this month Mr. A. Wormald, managing director of Fisons, left Britain for a two-week tour of Latin America. Object of the tour, says Mr. Wormald, is to see what opportunities exist for the establishment of Fisons manufacturing enterprises in Brazil and Mexico.

"The Germans, French and Italians have been very active in this important part of the world for several years since the war, while British industry, with one or two notable exceptions, has been slow off the mark. Fisons have available plenty of capital and a wealth of valuable manufacturing know-how extending over a wide range of chemicals, particularly in fertilisers. The potential for fertiliser manufacture is great, especially in Mexico." Mr. Wormald's other special interests will be pesticides and pharmaceuticals.

Fisons have 20 subsidiary and associated companies overseas, but no manufacturing interests in the South American continent. "We feel it is time we made some investment," comments Mr. Wormald.

crystallisation of natural rubber can be carried out in latex or dry rubber. The first method is probably best carried out at the plantations and involves addition of a thiol acid to latex. The second can conveniently be carried out before compounding or during cure.

Natural rubber modified in latex is reported to be similar to rubber modified in the dry state before compounding. The dry rubber process involves treatment of the rubber with butadiene sulphone (from Whiffens Ltd.) and cyclohexylazocarbonitrile (CHDN—also from Whiffens) at a high temperature although during addition of butadiene sulphone temperature should not exceed 100°C.

Modification before compounding requires the use of an extruder or an enclosed mixer such as the Baker Perkins Universal Masticator VN3 is used as a carrier for the butadiene sulphone and CHDN and must be blended with these materials before compounding modification during cure is limited to curing by peroxides, e.g. Di-Cup.

Formulations for 10 natural rubber-based compounds for low temperature service are given in Technical Bulletin No. 4. Copies are available, free of charge, from the Natural Rubber Development Board, Market Buildings, Mark Lane, London E.C.3.

I.C.I. Terylene Plant for Antrim

On Tuesday, a survey began of a 200-acre site at Kilroot, County Antrim, N. Ireland, on which Imperial Chemical Industries Ltd. propose to build a Terylene plant.

Changes in Embargo List for Communist Bloc

A COMPREHENSIVE and up-to-date list of goods subject to strategic embargo has been published in the *Board of Trade Journal* for 5 February. Items deleted include germanium, cobalt compounds and petroleum-based hydraulic fluids. The embargo now includes some narrow ranges of specialised strategic equipment not previously covered.

Changes have been made in entries concerning the following:

Ion vacuum pumps, excluding those with pumping speeds of less than 800 litre of hydrogen a second at a pressure of 10^{-6} millimetre of mercury or more.

Valves, cocks and pressure regulators designed to operate at -130°C and those with flow contact surfaces made with 90% or more of tantalum, titanium or zirconium; 50% or more cobalt or molybdenum; p.t.f.e. and polytrifluorochloroethylene.

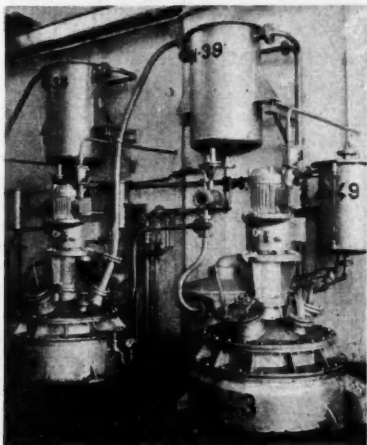
Pipe and tubing made of, lined with or covered with, p.t.f.e. or polytrifluorochloroethylene.

Certain containers, jacketed, for storage or transport of liquefied gases of 500 gall. capacity or over.

Stabilisers for explosives: ethyl and methyl centralites; NN-diphenylurea (unsymmetrical diphenylurea); methyl-NN-diphenylurea; ethyl-NN-diphenylurea; ethyl phenyl urethane; diphenyl urethane; diortho tolyl-urethane; 2-nitrodiphenylamine; p-nitromethylaniline.

Hydrazine in concentrations of 70% or more; hydrazine nitrate; unsymmetrical dimethyl hydrazine.

New Spanish Plant for H. and W. Whiteners



Part of a new Spanish plant installed for the production of optical whitening agents being made under licence from Hickson and Welch Ltd., Castleford, Yorks, by S.A. Rovira Bachs y Maciá, dyestuffs producers, Barcelona

Glaxo Build New Argentine Factory

New plant for the Argentine subsidiary of Glaxo Laboratory Ltd. is nearing completion in the industrial section of the Munro area of Buenos Aires. The new premises replace the original factory in another district of the city. The new factory, which occupies about 10 acres, will consist of a two-storey office block, laboratory and manufacturing buildings.

The general manufacturing block will also accommodate the medical centre and a nursery for young children of mothers on the staff. As there is not sufficient electric power available in this industrial area of Argentina, Glaxo like other companies will have its own generating plant.

BRAZILIAN REFINERY CONTRACT FOR JOHN THOMPSON

A LARGE contract has been obtained by John Thompson (Wolverhampton) Ltd. through the company's membership of Brefcon, the British consortium formed 18 months ago for the purpose of supplying plant for the Petroleo Brasileiro S.A. (Petrobras) Duque de Caxias Refinery, in Rio de Janeiro, Brazil.

Foster Wheeler Corporation, of New York, are the engineering contractors in association with Foster Wheeler Ltd., of London, for the Petrobras refinery and from them the Wolverhampton company received a contract worth over £116,000 to manufacture rotating disc contactors.

Comprising pressure vessels welded to Class 1 pressure vessel standards, and internal shafts complete with rotating discs housings and bearings, these rotating disc contactors are being manufactured by John Thompson under licence from Shell. The contactors are the largest yet designed and are the first to be made in Britain. Production has already started.

Each vessel, of 9 ft. diameter and 55 ft. length, weighs 85 tons and is made from $2\frac{1}{4}$ in. thick carbon steel; with its design pressure 585-600 p.s.i., it will

work at a pressure of 530-545 p.s.i., and will operate at a temperature of 190°F (design temperature, 230°F).

An earlier order placed by Foster Wheeler with the John Thompson (Wolverhampton) company was for four reactor vessels for the Duque de Caxias refinery, the value of the order being £76,420. Work on these vessels—three Houdrifomers and a pre-treater—is now well advanced, and it is expected that the first vessel will leave Wolverhampton in February of this year.

Steels of thicknesses in excess of 6 in. have often been roll-formed for a variety of purposes by John Thompson (Wolverhampton) but, before work on the Petrobras contract was started, pressure vessels of such thicknesses had never been roll-formed by the company.

Also manufacturing equipment for the same contract are the John Thompson (Dudley) company. Their order, worth £30,000, calls for the manufacture of accumulators, blow-down drums, kerosene strippers, dissolving tanks, and structural steelwork.

The Petrobras contract insists that full records of vessel fabrication are kept and that photographs of the various phases of production are kept on file.

A. M. Lock's Midlands Instrumentation Show

FOURTH annual exhibition of electronic chemical and nuclear instrumentation equipment of A. M. Lock and Co. Ltd., Prudential Buildings, Oldham, Lancs, is being held at Bennett Hall, Y.M.C.A., Snow Hill, Birmingham 4, from 22 to 25 March. Exhibits will include equipment from W. G. Pye, A. M. Lock, Evans Electroselenium, Elop Moisture Meters, Elcontrol, Telequipment, Southern Instruments, etc.

Papers will include 'Flame detection systems for furnace safeguard applications', 'Recent developments in gas chromatography', 'pH measurement and control', and 'Automatically controlled

continuous detoxication plants for trade wastes containing cyanide and chromate'.

Tickets for the exhibition and lectures are available from A. M. Lock and Co. Ltd., Newborough House, Newborough Road, Shirley, Solihull.

Messel Medallist for 1960

The Messel Medal, the senior award of the Society of Chemical Industry which is awarded every two years in gold, will be presented to the medallist for 1960, Viscount Chandos, in Bristol on Wednesday, 6 July during the S.C.I. annual meeting.

Appeal for Staff Training College

Sir Alexander Fleck, I.C.I. chairman (right) talks to Sir Willis Jackson, director of research and education of A.E.I. Manchester Ltd., chairman of the Government committee on the supply and training of teachers for technical colleges (left) and A. A. Part, Under-Secretary for Further Education (centre). (See 'Distillates', p. 280)



STEAM-OXYGEN GASIFICATION OF FINES IN FLUID BEDS AT ELEVATED PRESSURES

KINETIC data from operation of a semi-commercial-scale fluid-bed gasifier at Hydrocarbon Research Inc.'s Trenton (New Jersey) Laboratories were presented in a paper by Arthur M. Squires, now a consultant in New York City and associated with Constructors John Brown Ltd., to the Institution of Chemical Engineers on 2 February in London. The correlations presented in the paper permit estimation of projected commercial performance of a pressurised fluid-bed gasifier operating on anthracites and chars or cokes.

For a number of years Hydrocarbon Research have been engaged in the development of a low-temperature, high-pressure fluid-bed gasifier. Development is not complete, but a semi-commercial unit has operated at a capacity of 650,000 s.c.f. a day on fine sizes of Pennsylvania anthracite and commercial attractiveness of the process for this material is assured. Operation on other coals is stated to present problems both concerning loss of fines in fluid-bed effluent gases and also concerning carbon levels on ashes and operating temperatures which are permissible from the standpoint of clinkering. Feeding of coking coals remains to be demonstrated in the semi-commercial unit. The kinetic results obtained permit projection of commercial performance of the gasifier on a variety of solid fuel feedstocks. This project is reported to clearly indicate the attractiveness of the process, and further work, it is suggested, should yield worthwhile results.

Kinetic Data

Squires' paper is concerned primarily with organising available kinetic data to permit estimation of commercial performance of the low-temperature high-pressure fluid-bed gasifier. To make such calculations, working hypotheses have been needed concerning effect of bed depth, carbon level, temperature, pressure, and steam rate upon gasification rate. Prediction of commercial performance on Pennsylvania anthracite is reliable and for other coals more can now be said of operation upon char or coke than of operation with feed of raw coal directly to the gasification bed. Fairly good prediction of performance, it is suggested, should be possible for coke prepared from high-volatile bituminous coal.

Productive capacity of the gasifier has been found to depend primarily upon rate of reaction $C + H_2O = CO + H_2$ and secondarily upon rate of the reaction $C + 2H_2 = CH_4$. This last reaction, it is noted, generally proceeds so rapidly in fluid-bed gasification that methane and hydrogen in gasifier effluent appear to stand substantially in thermodynamic

equilibrium with carbon in the bed. Methane production in a moving-bed gasifier, like the Lurgi unit, does not correspond to thermodynamic equilibrium at the temperature at the top of the gasification zone. An explanation suggested by Dent is that the difference appears to be a result of top-to-bottom mixing of solids in the fluid bed.

The reaction $C + H_2O = CO + H_2$ is dealt with and an empirical correlation of reaction rate versus space velocity is given. Rate data for chars and cokes of various sources are compared in terms of the correlation, and rate data for continuous feed of raw coal are compared with data for batch gasification of char from the same coal. The question of variation in steam-carbon reaction rate with percentage carbon in the gasification bed was examined in the light of the correlation.

Hydrocarbon Research Unit

The unit employed by Hydrocarbon Research is 26.5 in. in inside diameter and was operated at a bed depth of 25 ft. Anthracite fires were gasified with steam and oxygen at pressures between 170 and 245 p.s.i.g. and temperatures between 1,430° and 1,676°F. As much as 650,000 s.c.f. a day of hydrogen, carbon monoxide, and methane has been produced.

Fluid-bed hydrodynamics have been found to have an important effect upon steam-carbon reaction kinetics. Top-to-bottom circulation of solids in the gasification fluid bed is stated to lead to a periodic reactivation of carbon near the bottom of the bed, where steam partial pressure is high and hydrogen partial pressure is low.

High carbon activity prevails throughout the fluidised gasification bed, Squires reports. In a fixed-bed gasifier, operating above about 1,600°F, there is a gradient in carbon activity, with high activity near the steam inlet and low activity at the gas outlet.

Available fluid-bed gasification data are organised by Squires into a consistent picture. This formation of methane in fluid-bed gasification, at space rates generally employed, is determined by approach to a 'quasi-equilibrium' between char, methane and hydrogen. Char has a free energy higher than graphite, higher by several kilocalories per grain-mole in some cases. The excess pre-energy[™] is related to thermal data obtained on carbons of various surface areas. Methane yield in fixed-bed gasification, it is indicated, may be considerably below that required to satisfy the quasi-equilibrium because of deactivation of carbon away from the steam inlet.

With regard to the empirical cor-

relation given for integral rates of the steam-carbon reaction in the fluid bed, this correlation is applicable to anthracite and chars of bituminous coals, including a low-rank Warwickshire coal. The problem of relating the empirical correlation for integral rates to the appropriate differential rates is discussed. With some coals, notes Squires, there is a decline in gasification rate at low percentages of initial carbon remaining.

The data obtained by Hydrocarbon Research are believed to provide a sound basis for projection of commercial performance of the pressurised fluid-bed gasifier on anthracite. The data demonstrate the ability to achieve gasification rates in a fluid bed of large diameter comparable to those observed in laboratory-scale equipment. Performance on a moderately higher pressure than that used in Hydrocarbon Research tests can be safely estimated, Squires reports, without change in the rate correlation. May *et al.*'s k_1 -, k_2 -, and k_3 -values for the Gadsby-Hinshelwood-Sykes rate expression may be used to infer, in a rough way, the effect of pressure upon rate. Calculated gasification rate at 125 p.s.i.g. is increased only about 7 to 10% if pressure is increased to infinity (overlooking the fact that equilibrium for the steam-carbon reaction would then be exceeded).

Most of Hydrocarbon Research's data were obtained at about 11% of initial carbon remaining—an economically desirable carbon level.

Lab-scale Fluid Bed

The laboratory-scale fluid bed, Squires states, is a poor tool for determination of the intrinsic reactivity of a carbon toward steam, and comparisons among the available data are subject to uncertain effects not only of variations in efficiency of gas-to-solid contact but perhaps also of variations in rate of circulation of solids from top to bottom of the bed. Only in one instance can a direct comparison be made between results obtained by two experimenters who worked on identical material. Goring, Curran Tarbox and Gorin (*Indust. Engng. Chem.*, 1952, 44, 1051) gasified the same low-temperature coke which May *et al.* (*ibid.*, 1958, 50, 1289) used, at atmospheric pressure. The former used a bed of 1.5 in. at 0.44 ft./sec., while the latter used a 3.75 in. reactor at 0.75 ft./sec. As Goring *et al.* were studying various conditioning procedures, data showing the effect of conditioning upon rate must be applied to the particular run for which detailed results were given, in order to obtain a direct comparison with May *et al.*, Goring *et al.* observe a specific gasification rate (after about 20% of initial carbon was gasified) which was approximately 30% higher than May *et al.*'s rate.

For rough calculations, Squires suggests use of the correlation of May *et al.*'s data at 125 p.s.i.g. for cokes and chars of bituminous coals. Cokes of lower-rank fuels may be given higher gasification rates. Only rough estimates can be made for rate of gasification of fixed carbon when high-volatile fuels are fed continuously.

CANNED MOTOR PUMPS NEED NO GLAND OR SEAL

L. A. Mitchell to Manufacture U.S. Models

PUMPS have for some years been available in the U.S. which do not have any form of gland or mechanical seal, neither do they have any form of shaft sealing device whatsoever, nor do they need one. The pump impeller is joined directly to the motor rotor by a short shaft extending from the rotor chamber to the pump chamber, and pumped fluid is allowed to circulate in the rotor chamber, cooling the motor, and lubricating the bearings. Stator windings are isolated from the pumped fluid by a non-magnetic corrosion-resistant liner, and the rotor itself is protected by a similar corrosion-proof can. Thus all parts of the combined motor and pump coming into contact with the pumped fluid are of corrosion-resistant materials. The stator and rotor cans may be made from any suitable non-magnetic material, and a wide range of alloys is available.

It will be obvious that this design is particularly suitable for the pumping of radioactive, toxic, noxious, volatile or corrosive fluids. Maintenance is virtually eliminated due to the absence of glands or seals, and pumps will run without any attention other than changing the internal bearings after a working life of six to 12 months, dependent upon operating conditions.

Short Transmission Shaft

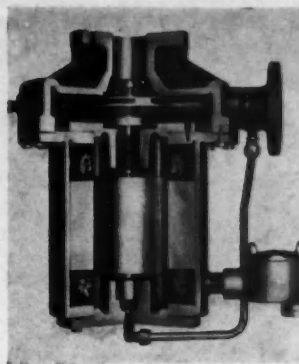
Due to the very short transmission shaft, absence of intermediate couplings, bearings, etc., mechanical efficiency is high. It is reasonable to suppose that eventually the larger proportion of pumps handling the types of fluid mentioned above will be of this glandless form of construction, and in the near future the type will almost completely replace conventional pumps for these duties in the chemical and process industries.

A canned motor pump of this type is currently available through L. A. Mitchell Ltd., Manchester, who are at present importing the Chempump as manufactured by the Chempump Corporation of Philadelphia U.S., and are forming the British Chempump Corporation Ltd. to manufacture certain models based on proved manufacturing techniques and designs of the American company in this country. These British manufactured Chempumps will be available as soon as special manufacturing facilities are established, and meanwhile pumps of American manufacture can be imported without restriction.

Several models are available, including small pumps to fit in pipelines for boosting flows ('The bump-in-the-line pump'), high-temperature versions with built-in internal cooling circuits, enabling liquids such as Dowtherm, etc., to be pumped at temperatures as high as 1,000°F, and a double-ended model for high heads, in which the two impellers may be used in

series or in parallel. The motors may be either of the totally enclosed or flame-proof design, and high-pressure models are also available for use with line pressures up to 5,000 p.s.i.g.

Stator linings are fabricated from carefully inspected sheets of non-magnetic alloys. A special welding technique is used to provide a weld of the same homogeneous metal as the alloy, and the welded liner is then welded to the stator end bells, hermetically sealing the winding. Bearings for standard Chempump models are of carbon/graphite materials (with no organic binder) shrunk into suitable alloy sleeves. Special bearing materials can be made available at request. Complete concentricity, alignment and interchangeability are main-



Cut-away view of the Chempump

tained by honing the bearing assembly on the inside diameter, and grinding on the outside diameter to close tolerances, and a wide choice of materials is available, including cast-iron, cast-steel, 300 series stainless steel, monel, Carpenter/20 alloy, Hastelloy B and titanium.

Plessey Make Metallux Resistors

INSTALLATION of a new unit at the capacitors and resistors division of the Plessey Co. Ltd., Ilford, Essex, follows the recent agreement between the company and Elettronica Metal Lux S.p.A. providing for manufacture of Metallux resistors in the U.K., and under which, in addition to sole manufacturing rights, Plessey hold the selling rights for the U.K. and all Commonwealth countries.

Metallux resistors are constructed of a special nickel-chrome alloy deposited on a ceramic former or core by a vacuum deposition process. This process results in a robust and durable film of resistive alloy permanently bonded to the core. Stability, noise, temperature coefficient and voltage coefficient characteristics of the completed resistor are claimed to be distinctly better than those of conventional fixed resistors.

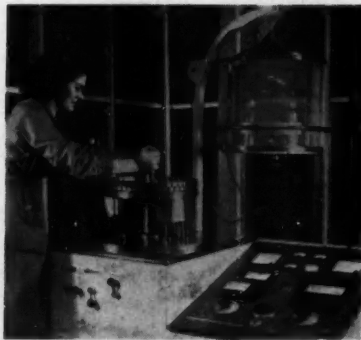
From 100 to 700 resistors can be treated at once depending on the size of the ceramic former. The carrier holding

the formers is placed in a vacuum chamber, the spools carrying the formers being separately rotated as the carriage moves. Four evaporation sources—equally spaced below the carriage—are heated and alloy is deposited on the formers.

When the deposition process is finished the carriage is removed and a protective coating of silicone varnish is immediately brushed on to each resistor. Metallised resistors are then placed on wire carriers and stabilised at a high temperature, and the resistance is checked while a heated metal shroud brings the resistors to a temperature of 85°C. Individual resistors are then measured for ohmic value.

Final processing, dependent on the type of resistor required, is usually one of three main methods of treatment and the paint protection, ceramic covering and epoxy resin encapsulation.

The resistors are finished with an unpainted ceramic sleeve with solder end seals, type RP, comprising six sub-types, is essentially a power resistor designed for use where high wattage dissipation is required, and its resistive film is terminated through a sintered silver ring deposit on the core. Final termination is through metal clamps designed to maintain good contact pressure against the silver under all conditions.



Vacuum deposition process for Metallux resistors

Smaller-than-pinhead Radiation Detector Developed

A radiation detector smaller than a pin-head and depending for its action on a piece of silicon which has boron and phosphorus diffused into it, has been announced in the U.S. by Hughes Aircraft. With quantity production it is expected that cost of the detector will be under 70¢ each.

NAPHTHALENE TRENDS IN U.S.

Output Should Reach 550 million lb. by June, with Consumption at 95%

FOR the first half of this year, naphthalene demand in the U.S. is expected to remain strong. Even with coke ovens in operation again after the prolonged steel strike, supplies will be critical for a short while but by the middle of the year demand is seen as lessening.

Production, according to a survey by *Chemical and Engineering News* (1960 38, No. 3, 19), is likely to reach around the 550 million lb. mark while imports will fall to about 30 million lb. bringing the total naphthalene supply to around 560 million lb. Consumption could take 95% of the supply.

Early in 1959 there was no marked demand for naphthalene, but shortages began to be noticed about February and in March output had increased by 60% over the previous month's production and by June the rate of production was running at some 600 million lb. a year.

During the steel strike supplies were so critical that phthalic anhydride producers were down to a 50% operating rate.

It is estimated that about 80% of naphthalene production is used to produce phthalic anhydride (a ratio of 1.23 lb. of naphthalene to make 1 lb. of phthalic anhydride). This year, U.S. phthalic anhydride production is expected to reach nearly 390 million lb. with consumption running at 30 million lb. less.

Phthalic Outlet

Main outlet for phthalic is alkyd resins, which will take up 42% of phthalic anhydride consumption, followed by plasticizers, accounting for 38%. The balance is used in polyesters and for other uses.

Other outlets are expected to take up 80 million lb. this year, e.g. refined naphthalene.

Price. Present selling price for naphthalene in the U.S. is 5 cents/lb. and no change is expected in this first quarter and it is considered probable that it will remain at this level throughout the year. The price of phthalic anhydride, now listed at 17 cents/lb. is expected to continue at this level throughout the year.

Capacity. This is judged to be adequate with coke oven tar capacity about 1,000 million gallons a year. To meet expected demands some 775 million gallons of tar are expected to be processed for naphthalene, at an average rate of 0.70 lb. of naphthalene per gallon of tar. If necessary recovery rate could be raised to 0.75 lb./gall. or higher.

Outlook in 1965. The naphthalene market in 1965 is expected to be 14% above the 1959 level, with phthalic anhydride taking the major portion of supplies. In 1961, a new outlet for naphthalene should appear—carbamate insecticides which could mean a 35 to 40 million lb. demand annually. (Union Carbide

Chemicals are planning to build a carbamates manufacturing plant at Institute, West Virginia.

Supply Sources. Present U.S. naphthalene capacity is of the order of 590 million lb. This capacity could rise to 910 million lb. by 1965 as coal tar availability increases some 15%, with recovery rates moving towards the 1 lb.-per-gallon level (0.75 lb.-per-gallon at present). According to U.S. Steel production in 1965 will be about 680 million lb. To meet these demands, petroleum sources will probably also be needed.

U.S. Producers. Main naphthalene producers are United States Steel, Koppers, and Allied Chemical with Reilly Tar and Chemical, Pittsburgh Coke and Chemical, Tar Distillers Corp., Ruberoid, and American Cyanamid making smaller quantities. Planning to build a plant at Buffalo, N.Y., to make 50 million lb. of

naphthalene annually are Ashland Oil and Refining, although these facilities could be used to make benzene instead. Other potential producers are stated to be Atlantic Refining, Tidewater, and Sun Oil Petroleum companies are understood to be desirous of making long-term contracts at prices between 5.7 and 7 cents a lb.

Seen as a threat to producers are phthalic anhydride and isophthalic acid via xylene oxidation processes. Oronite can make 18 million lb. of phthalic and also some 30 million lb. of isophthalic annually while Amoco's oxidation process when started could add 15 million lb. to the total.

Naphthalene imports. Recent imports have averaged 80 million lb. annually at prices 1 to 1½ cents a lb. less than the domestic price although during periods shortages the price rises (up to 10½ cents/lb.). Main exporters to the U.S. are the U.K. and West Germany, with the U.S.S.R. shipping some at a very low price. It is that the U.S.S.R. has some 25,000 tons available for dumping during periods of shortage.

Hydrogen-from-oil Plant in Japan Uses Texaco Partial Oxidation Process

ONE of Japan's largest chemical producing companies, Showa Denko KK, was forced by the extremely competitive fertiliser market several years ago to make plans for plant modernisation of their existing ammonium sulphate and urea production facilities. As the manufacture of hydrogen is, of necessity, the starting point in the realisation of this objective, it was of importance to produce low-cost hydrogen.

In the first instance the raw material available for product quantities was hydrocarbon gas from a nearby petrochemical plant.

It was also decided to use liquid hydrocarbons, e.g. gas oil, residual, crude oil, as raw material for long-range planning. Hence the choice of the Texaco partial oxidation as the basic process which can convert either oil or gas into a hydrogen-rich gas which, after purification, may be used for ammonia synthesis.

Awarded the contract to supply process design, partial mechanical design, and provide operating personnel for 'start-up' and training in November 1957, Foster Wheeler, in co-operation with their Japanese associated company, Ishikawajima, Foster Wheeler Co. Ltd., completed the plant at Kawasaki early last year. The plant has increased hydrogen production capacity by 8 million cu. ft./day and carbon dioxide production by 4 million cu. ft./day. Foster Wheeler have since received an additional contract for what is essentially a duplicate of this processing sequence.

The Process. There are two sections to the plant—the oil oxidation and gas oxidation sections. In the oil section, steam,

generated and superheated in a direct-fired heater, is fed with preheated oil to the Texaco generator. Oxygen enters the generator and reacts with the preheated oil in the presence of steam to form hydrogen and carbon monoxide.

In the hydrocarbon gas oxidation section, oxygen reacts with preheated hydrocarbon gas in the second Texaco generator, forming hydrogen and carbon monoxide. Products of the reaction in both sections are quenched with water and flow to their respective water-scrubbing systems.

Formation of Hydrogen and Carbon Dioxide. Effluents from both scrubbers flow to the shift converter where, catalytically, under optimum conditions of temperature and pressure, the water gas shift reaction takes place: water and CO reacting to form hydrogen and CO₂. As this is an exothermic reaction water has to be injected to prevent excessive temperature rise which would result in a lower percentage of CO conversion.

CO₂ Removal. From the shift converter, the gas stream flows to the CO₂ removal system. A split-stream system is used. Waste heat available in the gas stream is stated to be adequate for supplying the reactivation heat required by this CO₂ recovery system. An existing purification plant, is used for final concentration of the hydrogen.

Construction. Foster Wheeler engineers worked with Showa Denko's engineers. Japanese equipment was used for most items with the exception of certain specialised items not available locally. Start-up was smooth and the plant has been accepted by Showa Denko.

Overseas News

TENNESSEE EASTMAN'S POLYPROPYLENE WAX HAS HIGH GREASE RESISTANCE

AS a result of research on low molecular weight, wax-like polymers, including polypropylene, Tennessee Eastman have developed a process for making polypropylene wax.

Dr. J. E. Guillet and Dr. H. W. Coover, Jr., reported at a Society of Plastics Engineers meeting in Chicago recently that catalysts generally used to make polypropylene tend to give very high molecular weight polymers. Whatever low molecular weight components are present are largely amorphous.

In U.S. Patent 2,835,659, Tennessee Eastman give details of their process. High molecular weight crystalline polypropylene is heated to over 300°C under carefully controlled conditions. This reduces the molecular weight to any desired range without altering the stereochemical nature of the pigments. Breaking up the polymer is stated only to affect the ends of the chain and so there is little effect on the ability of the polymer to crystallise. Waxes with average molecular weights ranging from about 1,000 to 10,000 can be produced.

Unique properties of the waxes, according to Tennessee Eastman, are high melting point, stiffness, and hardness, combined with a low melt viscosity. These make it suitable for use as a modifier for other plastics to improve scratch, block and scuff resistance.

Also a possibility is the use of the wax in paper coatings. While grease resistance of polypropylene wax has been found to be less than that of extruded polythene coatings, it is much higher than that of polythene wax.

Soviet Natural Gas Output Higher by 25%

Figures issued this week by the Central Statistics Administration of the Soviet Union show that output of natural gas was, at 37,200 million c.m., higher by 25% than the 1958 production and that mineral oil production, 129 million metric tons, increased by 14% over the year.

French Sulphuric Acid Plant for Yugoslavia

The Jugotehna organisation of Belgrade has placed an order with the Compagnie des Ateliers et Forges de la Loire, of Paris, for the supplying of a complete sulphuric acid plant for the large copper and non-ferrous metals refinery at Bor in Yugoslavia. Total value of the contract is given as 980 million old francs, and delivery is to be by the end of the current year.

5,000 Ton/Year Phthalic Anhydride Plant

A phthalic anhydride plant will be opened early this year by the Reichhold

Chemie AG concern, at Hausen, near Brugg, in Switzerland. Initial capacity will be 5,000 tons a year. Further extensions are to be made to the plant during the coming three years.

Bayer Pharmaceuticals in Colombia

Work is to start this year on the erection of a pharmaceutical plant in Bogotá, Colombia, by the Colombian subsidiary of the Farbenfabriken Bayer AG concern of Leverkusen, West Germany. An initial investment of 3 million Colombian pesos will be required for the installations, which should come into primary operation towards the end of the year. Packaging installations will also be present on the 11,000 sq. yd. Bogotá site.

W. R. Grace Acquire U.S. Petrochemical Company

W. R. Grace and Co. have purchased a majority holding in Cosden Petroleum Corporation, who are engaged in the production, refining, and marketing of a complete line of petroleum products.

For several years Cosden have been developing the production of petrochemicals, including benzene, xylene, toluene, styrene monomer, polystyrene, polybutene, *o*-xylene and paraxylene.

Hoechst Pharmaceutical Plant for Egypt

Farbwerke Hoechst AG announce that they are establishing a pharmaceutical plant in Egypt.

Danish-Norwegian Project for Calcium Nitrate

A/S Ammonia, a company formed jointly some years ago by the Dansk Svovlsyre og Superphosphat-Fabrik, of Denmark, and the Danish sales office of the Norwegian Norsk Hydro concern, are to erect the first fully-automatic plant for the production of calcium nitrate. The plant, to cost some Dan. Kr. 100 million (£5.2 million) will manufacture about one-third of the total annual demand of the Danish agricultural industry. As raw material, lime deposits in the Grenaa area of Jutland will be used.

Polythene and Other Polymers in Radiation Shielding

The possibility of using polythene or other polymers in radiation shielding lead to research by C. Heller, S. Lewinson and C. Nudelman of T.R.G. Inc., U.S., for the Wright Air Development Centre, U.S. Air Force. Also investigated as part of this research project were the interaction of polythene and radiation with regard to cross-linking, gas evolution, and changes in melting point, composition and crystallinity. Other polymers

considered were polymethylene, polyisobutylene, and polystyrene.

Heller *et al.*'s work is now published as a report by the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C., as Order PB 15-15-84, price \$1.50.

Superphosphates Plant Planned in Tunisia

A group of farmers and other private shareholders financed by a Swedish bank, is to build a plant at Sfax, Tunisia, for the manufacture of triple superphosphates.

An investment of about \$8.5 million is involved and initial output of the plant is scheduled at about 100,000 tons a year.

Monsanto Offer Ethylene-maleic Anhydride Copolymers

Now obtainable from Monsanto Chemical Co., U.S., are ethylene-maleic anhydride copolymers. They are in white powder form and obtainable in various polymerisation grades. The polyanhydride can easily be processed into polyacids, polyamide-ammonium salt and similar derivatives. Its uses are in the adhesives, cosmetics, textiles and paints industry.

Finnish Move to Form World Plastics Association

The staging of an international plastics exhibition is announced for Helsinki for 13 to 18 September 1960. It will be associated with a congress at which the main topic will be the setting up of an international organisation for the plastics industry. After the end of the exhibition, the congress discussions will be continued at Pallastunturi, in Finnish Lapland. Further details are obtainable from the Finnish Plastics Association at Eteläntie 10, Helsinki.

Dow to Build Manufacturing Plant in Italy

A new company, Dow Chimica Italiana S.p.A., has been formed and is to construct a multimillion dollar manufacturing plant in Italy, state Dow Chemical International. This wholly-owned Dow subsidiary will open its marketing office next month in Milan to assist in better servicing of customers.

Plans for the plant site are not yet finalised, but a number of products are being considered for production, one of which is the entire Styron line (Dow polystyrene).

Production of Potassium Salts in Sicily

Technicians of Montecatini Co. are completing installation of plants to permit utilisation of potassium salts of the Bosco Mines, situated in the Province of Caltanissetta in Sicily.

The potassium salts mined will be processed partly in the new plant which is being built at Campofranco and partly at the Akragas plant at Porto Empedocle, while a large quantity will be exported by sea.

The maximum potential of the Campofranco plant has been estimated at 50,000 tons of K₂O a year which would

be sufficient to cover the requirements of the whole country. The raw mineral, which has an average K_2O content of about 12%, will be first conveyed into a flotation plant which will be able to turn out about 1,300 tons a day of enriched kainite with 17% content of K_2O . This latter will be transformed into commercial potassium sulphate at the rate of about 350 tons a day.

Courtaulds German Firm in Carbon Disulphide Venture

The West German associate of Courtaulds, Glanzstoff Courtaulds GmbH, Cologne, have together with Dr. Jacob Chemische Fabrik GmbH, Bad Kreuznach, formed a petrochemical producing company bearing the name of Carbusol Chemische Werke GmbH, Cologne. The company, which has a primary capital of DM4,500,000 (£375,000), will erect and operate a plant for the production of 52,000 tonnes of carbon disulphide annually on the Glanzstoff plant in a Cologne suburb.

The plant will work to a licensed process of the Food Machinery Corporation, New York, and will take as starting materials products of the local petrochemical industry. Co-ordination of the plant with existing sulphuric acid and synthetic fibre units of the Glanzstoff concern will permit a utilisation of waste gases. The Dr. Jacob concern are specialist producers of carbon disulphide and by-products. Building of the plant is expected to take some two years.

Ammonium Nitrate Project in Rumania

A plant for the production of ammonium nitrate is reported to be under construction at the Fagaras chemical plant, in the Rumanian province of Transylvania. Initial capacity will be 100,000 tonnes a year. At present the plant is building up output of phenol for the synthetic fibre industry.

S.B.A. Russian and Japanese Contracts

Now concluded with the company Etudes et Recherches Industrielles (E.R.I.) in Brussels by the Russian Organisation Techmasimport is a contract for supply to the U.S.S.R. of a plant producing acetylene from natural gas. The production processes that will be used belong to Société Belge de l'Azote et des Produits Chimiques du Marly (S.B.A.), Liège, Belgium, who will carry out the engineering and ensure the supply of the equipment required for this unit. S.B.A. are granting exploitation licences of their techniques to Techmasimport.

S.B.A.'s acetylene production processes are already industrially applied by Houilleries du Bassin de Lorraine (France). They have also been adopted by Sumitomo Chemical Co. Ltd. (Japan), who are to set up at Niihama City a plant to produce acetylene and ethylene from liquid hydrocarbons.

The Japanese Government have authorised Sumitomo Chemical Co.'s agreement with S.B.A. for the above

plant. S.B.A. will design the plant which is the first unit constructed in Japan for the simultaneous production of acetylene and ethylene by pyrolysis of liquid hydrocarbons.

With Techmasimport, S.B.A. have also concluded agreement on a contract for supply to the U.S.S.R. of two ammonia producing units. These units will use S.B.A.'s ammonia process as now being operated at their Marly plants in Brussels. The Russian plants will be based on the Marly plants and S.B.A. will carry out the engineering and be responsible for the supply of equipment required for the project.

\$12½m. Gas Processing Plant for Canada

A \$12½ million gas-processing plant which will have the largest capacity of any in Canada will soon be under construction near Rimbey, at the south end of the Dick Lake gas field.

British American Oil will be plant operator responsible for construction, maintenance and continuing operations. General contractors Poole-Pritchard Canadian Ltd. are scheduled to have the plant in operation by November 1960.

The plant will process up to 326 m. cu. ft. of gas daily. On this throughput daily output of the Rimbey plant would include: 280 million cu. ft. of saleable pipeline gas, 68,000 Imperial gallons of propane, 98,000 gallons of butane, 9,300 barrels of condensate and 233 long tons of sulphur.

California Standard Co. and British American Oil together hold approximately 67% interest in the plant.

U.S. Carbon Black Activities in France

Choice for a major U.S. penetration of the West European markets for carbon black is France. French consumption of

this product at about 50,000 tons a year was satisfied until three years ago from imports. In the next two or three years French output, it is estimated, may reach some 100,000 tons a year. And all except for about 10,000 tons will come from subsidiaries of leading U.S. producers.

United Carbon is the latest arrival, who announce the formation of a new subsidiary, United Carbon France, which is to build a factory with a capacity of 25,000 tons per annum at Port Jerome, beside the complex of refineries near the mouth of the Seine owned by the Cie. Française de Raffinage (controlled by Cie. Française des Pétroles), Shell, Esso and Socony Mobil. United Carbon's plant will cost about £1.8 million.

Work has just begun on a second carbon black factory, also of 25,000 tons capacity, at Bec d'Ambès, near Bordeaux, where another refinery complex belongs to Shell, Esso and Caltex. This is the responsibility of Coprablack, French subsidiary formed last year by Phillips Petroleum and Continental Carbon.

Third major producer of carbon black in France will be Cabot France, subsidiary of Godfrey L. Cabot Inc., whose plant at Berre, near Marseilles, produced 30,000 tons of carbon black last year. Output is scheduled to be increased to 35,000 tons this year and the installations are designed for an ultimate capacity of 44,000 tons a year.

Engelhard Industries Interest in S. African Plastics Company

A controlling interest has been taken by Engelhard Industries in Penta Chemical Industries, a Durban company, which is reported to be mining an increasing market in the plastics field. The polymer division of Penta, will be developed on a much wider scale and new polymer and copolymer resins in various forms will be manufactured, mainly for the paint industry.

Organophosphorus Epoxides with Greater Heat Resistance

SINCE available epoxies are limited to temperatures around 350°C (heat of distortion), epoxy plastics that can withstand 500°C are being sought. A possible way of accomplishing this is considered to be by incorporating phosphorus atoms into epoxide molecules, and investigating this is Kindley, Glekas and Ritt of Melpar Inc., Falls Church, Virginia, U.S.

Having regard to the fact that many phosphorus and silicon reactions are similar, and that silicone compounds are serviceable at relatively high temperatures, Kindley *et al.* have synthesised suitable organophosphorus epoxide monomers.

Two methods are possible: condensing epichlorhydrin with organophosphorus compounds having two or more hydroxyl groups; and introducing epoxide groups into diallyl and triallyl tertiary phosphine oxides. The first method is reported as having yielded new compounds; the second has yet to be tried.

Using the first method is the prepara-

tion of epoxide from tris-(hydroxymethyl) phosphine oxide (THPO) and epichlorhydrin. A chlorhydrin forms by reaction of the two compounds catalysed by acid. The chlorhydrin treated with a base gives the epoxide.

An extensive synthesis programme has been begun by the Melpar researchers for suitable organophosphorus compounds to react with epichlorhydrin to provide phenolic tertiary phosphine oxides. Syntheses for mono-, di-, and tri-functional tertiary phosphine oxides—*p*-hydroxybenzylidimethylphosphine oxide, bis-(*p*-hydroxybenzyl)-methylphosphine oxide, and tris-(*p*-hydrobenzyl)-phosphine oxide. To make the mono-compound, dimethylphosphonyl chloride is reacted with the Grignard reagent of (*p*-chlorobenzyl) phosphine oxide. This gives dimethyl(*p*-chlorobenzyl) phosphine oxide which is then treated with cuprous oxide and sodium hydroxide at 250°C to give the mono-functional compound.

U.S. TRANQUILLISER PRODUCERS INVESTIGATED BY KEFAUVER'S SENATE SUBCOMMITTEE

TRANQUILLISER drug manufacturers in the U.S. have been under attack in the last few weeks. They have met Senator Kefauver's Senate Subcommittee in Washington a little over a week ago for the opening of the senator's second investigation on drug prices. An anti-trust complaint has also been filed against the manufacturers, Carter Products and American Home Products.

In the box has been Mr. Walter A. Munns, president of Smith Kline and French Laboratories, Philadelphia, who make and sell two leading tranquilliser preparations, Thorazine (chlorpromazine) and Compazine (prochlorperazine), both phenothiazine derivatives.

The Subcommittee reports that in 1958 S.K.F. sold about \$45 million worth of Compazine and Thorazine out of the \$124 million worth sold in that year. Also it is asserted that S.K.F. have an exclusive manufacturing licence to make the compounds in the U.S. (patents on chlorpromazine are owned by Rhône-Poulenc, Paris, France, who licensed S.K.F. in 1952).

Mr. Munns, for S.K.F., said that the company's products did compete with other U.S. tranquillisers, and although it was not the discoverer of the drug, it had spent a lot of money in research and development of the use of the drug. The prices charged for the drugs were reasonable, and if the prize of Thorazine were reduced 1 cent per tablet, the reduction would completely wipe out S.K.F.'s profit on tranquillisers.

Cost of Chlorpromazine

According to Senator Kefauver, only in one country—Canada—was the cost of chlorpromazine higher than in the U.S. In the U.S. 50 tablets (25 mg. strength) of chlorpromazine cost the chemist \$3.03; in Paris, 51 cents; and in Toronto \$3.75. Mr. Munns contended, however, that costs were much higher in the U.S.

Economist on the Subcommittee, Dr. John Blair, stated that S.K.F. made a 42% profit (as a percentage of net worth, after taxes) in 1959 compared to 10.7% for all manufacturing. Mr. Munns attributes S.K.F.'s higher-than-average profits to streamlined management.

Advertising claims for Carter Products' (owned by American Cyanamid) tranquilliser, Miltown (meproamate) were reported to be misleading by Dr. Fritz Freyhan, director of research, Delaware State Hospital, and Dr. Heinz Lehmann, Verdun Protestant Hospital, Montreal, Quebec. Claims of "non-addictive" and "well-suited for prolonged therapy" for Miltown did not present the whole picture, they stated, and in a very few cases the drug could lead to addiction. Speaking for Carter Products, Dr. Frank M. Berger, president of Wallace Laboratory, Carter's ethical drug division, said that Miltown was not habit-forming if properly used, and that no physician would pre-

scribe a drug without first familiarising himself with it. Next on the list to come before the Subcommittee are Wyeth, division of American Home Products. This company markets, under licence from Carter Products, Equanil, a meproamate tranquilliser.

Revised B.S. for Sulphur Combustion Train

British Standard for 'Halogens and sulphur combustion train (micro-Grote)', B.S. 1428, Pt. A4, 1960, reflects the following changes to the 1953 edition: a small electric heater is included as an alternative to the Bunsen burner, a U-tube is specified instead of a gas washing bottle, and protective sheaths of nickel sheet instead of wire gauzes. Copies may be obtained from the B.S.I., Sales Branch, 2 Park Street, London W.1, price 4s (postage extra to non-subscribers).

Soviet Interest in British Instruments

BRITISH scientific and industrial instruments should be even more widely represented than had been planned at the special exhibition being organised in Moscow in June by the Scientific Instrument Manufacturers' Association (S.I.M.A.), suggest the delegation of Russians, which has been visiting this country to study U.K. instruments and their manufacture.

The delegation, which is headed by Mr. L. I. Loganov, member of the State Committee of Science and Technology under the U.S.S.R. Council of Ministers, emphasises that there is a large potential market in the U.S.S.R. They are willing to buy British equipment and suggest that

this opportunity of showing to a wide range of Soviet scientists and technicians whom they intend to invite should not be missed.

S.I.M.A. are ready to increase the scope of the exhibition to make it fully representative and are willing to include companies not at present members of that association. The association also say that companies should not be deterred from exhibiting in Moscow in June because of the Moscow exhibition planned for 1961. The Russians, it is reported, have said that they wanted to see what the U.K. had now without waiting 18 months.

U.K. Rubber Industry Opens Permanent Display at Science Museum

A permanent display representative of both producing and manufacturing sides of the British rubber industry has been presented to the Science Museum, South Kensington, London. Director of the Science Museum, Dr. T. C. S. Morrison-Scott, received the display at a ceremony on 3 February from the president of the Federation of British Rubber and Allied Manufacturers, Mr. H. G. W. Chichester-Miles.

Illustrated in three large showcases are the molecular structure of natural and synthetic rubbers; their production,

compounding and processing; the great variety of products so obtained, and the part they play in modern life.

Devised and organised by the Federation of British Rubber and Allied Manufacturers and designed by David Urwin, the display has been made possible by the generosity of British manufacturers of rubber products; makers of synthetic rubbers, compounding chemicals, processing machinery and components; the Natural Rubber Development Board representing producers of natural rubber; and the National College of Rubber Technology.



L. to r.: Dr. T. C. S. Morrison-Scott, director of the Science Museum, H. G. W. Chichester-Miles, president, Federation of the British Rubber and Allied Manufacturers, and E. S. H. James, chairman of the committee that organised the display

Chemist's Bookshelf

DEVELOPMENTS IN G.L.C.

GAS CHROMATOGRAPHY. 2nd Edit. By A. I. M. Keulemans. Edited by C. G. Verver. Reinhold Publishing Corp. Pp. xxi + 234. 60s.

Gas chromatography has had a tremendous influence on organic analysis during the past few years and the appearance of a second edition of Keulemans' work two years after the publication of the first edition indicates that the subject is still particularly live.

The bias in this book is towards the mathematical and theoretical aspects of the subject but the more these principles are thoroughly understood then the more valuable will be the practical applications. It should be understood in the first place that gas chromatography is essentially a method of separation of volatile substances as a result of their distribution between two phases. In the more widely practised form of gas chromatography, viz., gas liquid chromatography, one of these phases is a stationary phase of large surface area, and is a liquid phase carried on a solid support. The other phase is a gas that percolates through or along the stationary bed.

Variables in G.L.C.

There are a lot of variables in gas liquid chromatography, e.g. the nature of the carrier gas, the type of column and its temperature, the nature of the solid support and of the liquid phase and the type of detection system that is used as sensing device to indicate, to the analyst, the extent of the separation he has achieved. The separations that are effected must be sound both qualitatively and quantitatively and Keulemans' book will be of great help to the analyst in helping him with the requisite explanations of the phenomena he has observed.

After a general introduction to the subject Keulemans describes in great detail the apparatus used for gas liquid chromatographic separations and takes the opportunity to introduce full descriptions of up-to-date sensing devices, e.g. the argon β -ray detector developed by Lovelock in this country and the flame ionisation detector first described by McWilliam and Dewar.

The three chapters that follow deal with the general theory of chromatographic separations, with the nature of the mobile phase, the solid support and the stationary liquid phase in gas liquid chromatography. In this part of the book the treatment is highly mathematical but the theories advanced are more often than not supported by practical evidence of their validity.

Chapter 7 gives examples of the more advanced applications of gas liquid chromatography and includes, for instance, descriptions of improved packed columns and of coated capillary columns of excellent performance. There is a

final chapter on gas solid chromatography which, it is understood, is particularly useful in the characterisation of solid surfaces and the separation of isotopes.

There are one or two points to which the reviewer feels attention should be drawn. It might be useful in future editions to give more examples of the application of gas liquid chromatographic

Controlled Crystal Growth

CRYSTAL GROWTH. DISCUSSIONS OF THE FARADAY SOCIETY NO. 5, 1949. Reprinted 1959. Butterworths Scientific Publications, London. Pp. 336, figs. 184 (Pl. 34). 60s.

The study of crystal growth is of great importance both in pure and in applied science: in pure science because it helps to explain the extraordinary variety of crystal habit, the nature and properties of crystal surfaces, problems of solid state transitions, of melting and of metastable states: in applied science because of the variety of useful phenomena that depend upon either empirical or controlled growth processes.

It is now possible to make very small diamonds on a commercial scale, suitable for many industrial purposes; it is even possible to control their colour and habit at will. But although a few details of manufacture have been given, the whole story is not yet told. Crystals, large or small, are needed to make prisms, lenses, polarisers, gramophone needles, pivots, and for many purposes in connection with magnetic, ferroelectric or semiconducting properties. These are often more suitable if grown in the laboratory than as found in the mine. Moreover, changes of habit brought about by the deliberate addition of some impurity to the solution may make all the difference to safe storage or transit of the final crystalline product.

At a recent international conference held in the U.S., industrial and Government services were well to the fore with papers on the growth and properties of crystal whiskers. Ten years ago these were no more than a scientific curiosity.

But 1949 was a landmark in the history of the study of crystal growth, because it was in that year that Frank fully expounded his theory of the influence of dislocations. The Faraday Society Conference at which he did so was an extraordinarily powerful one because of the important and pioneering nature of many of the papers given at it and of the discussions (partly communicated in writing) that were published with them. Very often such pioneering papers are written with clarity and with a wealth of detail that is necessarily lacking in subsequent publications. It is in response to many requests that the Proceedings of the Conference have now been reprinted,

procedures to the solution of problems in more industries than the petroleum industry. Although it may be necessary, in certain cases in the petroleum industry, to have available the mass spectrograph for the examination of fractions separated by gas liquid chromatography, there will be many instances in other industries where great use may be made of the infra red spectra of separated fractions.

This book is definitely one for the student, whether in university, college or industry and it can be heartily recommended to all those analytical chemists who would like to be included in that category.

J. HASLAM.

after being for long out of print. It is a pity that minor obscurities have been reprinted without alteration (what are "fibrous or platy 010 crystals"?), but these are small blemishes in an otherwise welcome, though not inexpensive, publication. The absence of a subject index is a rather larger one. A Table of Contents is not the same thing.

KATHLEEN LONSDALE.

Emulsion Terminology Criticised

(Continued from p. 281)

bilisation of kerosene in a dilute solution of a secondary alkyl sulphate would illustrate this very clearly. Experimental details were published in his paper in *Proceedings of Second International Congress on Surface Activity* Volume 1.

These experiments had also demonstrated clearly how addition of electrolytes (e.g., sodium chloride) could improve the stability of emulsion which was contrary to the generally accepted belief that electrolytes invariably caused instability. In fact it was sometimes practicable (and moreover economical) to use salts to improve the stability of emulsions based on castor oil soaps.

One of the great difficulties confronting the worker in this field was the lack of precision in the terms used to describe phenomena. For example, the word inversion had been used to describe (a) phase inversion without separation, (b) phase inversion with partial separation of one phase and (c) breakdown of the emulsion into two phases. The S.C.I.'s Surface Activity Group could make a great contribution to the study of emulsions by helping to introduce some precision into the terminology.

In conclusion Dr. Sumner said it was useful to emphasise that the nature of both the liquid phases influenced the properties of the interfacial film. On the need for more precise terminology, he strongly agreed; as pointed out in his paper, even the term 'emulsion' itself was used ambiguously, and it would be helpful to have a new term to describe a system which was made by emulsification but was not necessarily an emulsion in the classical sense under the conditions of use.

Semenov's Book on Chain Reactions

SOME PROBLEMS IN CHEMICAL KINETICS AND REACTIVITY. Vol. I. By N. N. Semenov. Translated from the Russian by M. Boudart. Princeton University Press, New Jersey, and Oxford University Press, London. 1958. Pp. ix+239. 36s.

More than 20 years have passed since Professor Semenov's well-known book on chain reactions was first published. During this time the field of chemical kinetics has developed enormously and the importance of radicals in many reactions, particularly in polymerisation, oxidation and explosion processes, has been fully realised. Professor Semenov is one of the great figures of chemical kinetics and a new book, reflecting his views on developments in the past two decades, is an important event.

This book is divided into two sections, the first of which deals with radical reactions. The reactivity of monoradicals and the main types of radical reactions are first considered in detail. Activation energy and its correlation with heat of reaction, bond energies and their estimation and the activities of radicals and molecules are among the topics discussed. A short account of competition between monoradical reactions is followed by a chapter on diradicals which includes consideration of the transition of atoms to the valence-active state, the reactivities of certain important diradicals and the participation of diradicals in chain reactions.

Chain Reactions

The second section is concerned with chain initiation and termination. A chapter on dissociation of molecules and recombination of radicals deals with initiation and termination of chains, the influence of the termination process on kinetics and the inhibition of chain reactions. Another chapter deals with the initiation of chains by ions of metals with variable valence and a final one is concerned with initiation and termination at the walls of the reaction vessel.

Essential theories are concisely and lucidly reviewed. There are many tables and a wealth of experimental data is clearly and critically discussed. The book is well documented with references, many of which are Russian. Although essentially theoretical, one of the features of the book is the relevance, in many cases, to important industrial processes. Thus the importance of radicals in polymerisation is reflected in sections dealing with the addition of radicals to double bonds, the role of polar factors in radical polymerisation and copolymerisation and the initiation of chains by atoms of variable valence. New concepts of initiation and termination of chains at walls are applied to the interpretation of the mechanism of heterogeneous catalysis.

The translator has performed a valuable service in making available an ordered, critical and up-to-date account of a wide field of work which cannot fail to be a stimulus to research and of very great importance to all concerned in the study of chemical kinetics.

W. R. MOORE.

Metal Sequestering Agents

THE SEQUESTRATION OF METALS, by R. L. Smith. Chapman and Hall Ltd., London. 1959. Pp. vii+256. 42s.

Use of complexing or sequestering agents is widespread in modern technology and there are few industries which do not make use of these reagents in some fashion or other. Thus they are of prime importance in industries which differ as widely as agriculture and atomic energy and in branches of research ranging from microbiology through to classical inorganic analysis. Naturally, therefore, there is much widespread knowledge of the properties and applications and indeed of the chemistry of such sequestering agents but it is scattered diffusely throughout the literature and among chemists generally. This book by Dr. Smith represents the first compilation, or—more accurately—condensation of such knowledge between the covers of one book. As such its appearance now is timely and welcome.

The text is addressed to graduate or A.R.I.C. level chemists who use, or could use, such reagents with profit. Throughout the book the author has used the classical rather than the wave-mechanical approach to chelation. In this he has made a wise choice for the model is perfectly adequate for the purpose and there is little justification for introducing a much more complex explanation which may (or may not) explain some of the finer points, but otherwise tend to obscure the general view.

Account of Chelation

The author begins well by defining the concept of sequestration as presented in his pages; he then goes on to consider valency and basicity of reagent in relation to complex formation. This is followed by an account of chelation and the influence played in chelate formation by the nature of the ligand and the metal ion. The final 'background' chapter is concerned with the stability of chelates and the problems posed by competitive chelating actions. This part of the book is well balanced and integrated and surprisingly enough contains a clear account of many points that are easily missed or misinterpreted (if understood) in more erudite books on chelation. This is, I feel, a first-class contribution from Dr. Smith for it allows the reader to see the 'wood' unobscured by the 'trees'.

Subject matter after these first four chapters is largely concerned with more practical matters. Thus chapter 5 deals with the basic chemical and physical properties of sequestering agents. This includes complexones, polyphosphates, polyamines, β,β' -diketones, Schiff's bases, etc. The historical section which appears at the beginning of this chapter is excellent, but one feels that it might have been situated more appropriately near the beginning of the book. Chapter 6 deals

with general considerations on the application of sequestering agents and this is followed by a giant chapter which develops the theme of industrial applications of sequestering agents in 15 key industries. Ensuing chapters treat analytical and biological uses. The treatment of these two topics is less complete and is more or less confined to a classification of methods and a selected bibliography. In a way this is somewhat disappointing, for having read the previous parts of the book one feels that the author is sufficiently capable to have developed a more critical and constructive approach. Thus, analysts use EDTA almost exclusively for complexometric analysis yet there are several instances where it could profitably be replaced by other amino polycarboxylic acids of the complexone group. The final chapter outlines the author's view on future developments in sequestration.

This book is, I think, unique in the field. It is packed with well-presented information which is not available to those who do not have ready access to patent literature and presents a clear, well-balanced picture over a very wide field of research and industrial technology. There are some minor points of confusion and one or two debatable points of nomenclature and reference, but these in no way detract from a really first-class book, a copy of which should spend most of its life 'off' rather than 'on' the shelf in every chemical laboratory.

T. S. WEST.

Three New Monographs from the R.I.C.

JUST published in the Royal Institute of Chemistry Series of Lectures, Monographs and Reports 1959, is a monograph (No. 3) by Professor R. L. Wain on 'Some Chemical Aspects of Plant Disease Control'. Feeding plants resistant to disease, chemical control of plant diseases and investigations on fungicidal agents and systemic fungicides are dealt with by Professor Wain.

Last year Dr. Alexander Haddow gave the fourth P-F Frankland Memorial Lecture entitled 'Chemical Mechanisms in the Induction of Cancer'. This lecture has now been published. (R.I.C. Publication No. 4, in the Series Lectures, Monographs and Reports 1959.)

R.I.C. Monograph No. 5 is that by the late Dr. Wilfred Taylor, who was joint deputy research manager in Nobel Division of Imperial Chemical Industries Ltd. In 'Modern Explosives', Dr. Taylor covered a vast field ranging from explosion and detonation, explosive characteristics, theories of detonation, and explosive compounds and their manufacture.

Chemist's Bookshelf

Controlled Precipitation Methods

PRECIPITATION FROM HOMOGENEOUS SOLUTION. By *Louis Gordon, Murrell L. Salutsky and Hobart H. Willard*. John Wiley and Sons Inc., New York; Chapman and Hall Ltd., London, 1959. Pp. viii+187. 60s.

Analytical chemistry as a quantitative science originated from the gravimetric analyses of the late eighteenth and early nineteenth century chemists, Bergman, Klaproth and Berzelius. Today, gravimetric analysis retains an important place in quantitative analysis because of the exceptional accuracy which many of the analytical procedures possess. Gravimetric analysis involves the synthesis and isolation of a pure compound in theoretical yield and there are many factors which influence the accuracy of the analytical result, not the least of which are those affecting the purity of the isolated compound. Studies of the processes of precipitation under ideal and actual condition have shown that the purity and physical characteristics of an analytical precipitate depend very largely on the method of adding the precipitating reagent. In 1937, Willard and Tang published their results on the controlled precipitation of aluminium hydroxide using the temperature-dependent hydrolysis of urea to ammonia as a means of slowly raising the pH of the solution. This process, termed "precipitation from homogeneous solution" has been applied in principle, to a large number of gravimetric procedures and has stimulated interest not only in analytical precipitation but in many procedures involving separation by precipitation.

Variety of Procedures

This authoritative little book collects for the first time the variety of procedures involving the principles of controlled precipitation which are scattered throughout the literature. It contains 10 chapters, the first seven of which (including the introductory chapter) describe the precipitation of various inorganic salts, such as sulphates, sulphides, hydroxides, phosphates, oxalates, which have recognised applications in gravimetry. The remaining three chapters discuss in turn, coprecipitation from homogeneous solution particularly from a theoretical standpoint, fractional precipitation as applied particularly to the separation of barium and radium, and the rare earths on both a theoretical and a practical basis, and finally, an assessment of the existing and potential applications of the methods of controlled precipitations in chemical technology.

The book is well written (as one would expect from the three authors who have contributed a large part of the available literature on this subject) and the presentation of data is adequate for most analytical purposes. It is not, however, a laboratory manual of collected gravimetric procedures ready for application

to particular analyses. Practical details are provided, but mainly to illustrate the types of precipitation which can be effected by use of homogeneous precipitations. Although separation procedures are given prominence throughout the text, the applications are not always clear-cut and practising analysts may have difficulty in selecting the most suitable pro-

High-Temperature Measurements

PHYSICO-CHEMICAL MEASUREMENTS AT HIGH TEMPERATURES. By *J. O. Bockris, J. L. White and J. D. Mackenzie*. Butterworths, London, 1958. Pp. viii+394, illustrated. 75s.

In the preface of this much needed book the editors state that they have catered for "present and future chemists" working in the field of high temperature research. But why only chemists? Surely, metallurgists are intensely interested in this field too, both in pure research matters as well as in applications. This is one of major issues that I like to take up in this review.

Most subjects dealt with in the book, be they dealing with certain properties, e.g. density, surface tension or viscosity, or those chapters dealing with techniques of measurements, e.g. furnaces or calorimeters, are of equal interest to both chemists and metallurgists. The editors on the whole have paid insufficient attention to the metallurgical aspect of the various problems treated. For example,

cedure for a particular analysis. Nevertheless, this book is extremely useful to all interested in analytical precipitation, because it presents an informative account of the most significant advances in an important branch of quantitative analysis.

Specialised monographs of this type are generally welcome additions to the bookshelves of analytical chemists, but if these are to be priced as high as the present little volume, then their objects must to some extent be defeated, and their circulation confined to the libraries of affluent organisations and the fortunate few who receive copies for review.

W. I. STEPHEN.

chapter 3 dealing with furnace design and temperature controls would have benefited greatly by making use of metallurgical publications. Similarly the omission of purely gas-metal equilibria and techniques is hardly justified.

My second point concerns the general editorial policy. The book treats two separate issues, firstly, definitions and principles and secondly, methods and means of measuring various properties entering into such principles. The book is not well balanced in this respect. The text dealing with principles of various high temperature phenomena is largely available, thus chapter 2 deals with temperature measurements. What a research man working in this field needs, however, is an accurate and critical assessment of various methods, techniques and difficulties involved. In my view, the future edition of this book, which I hazard to predict with a fair certainty, should deal more with measurements proper and less with definitions.

V. KONDIE.

Molecular Spectroscopy Conference Reported

MOLECULAR SPECTROSCOPY. Edited by *E. Thornton and H. W. Thompson*. Pergamon Press, London, 1959. Pp. 352. 70s.

This volume contains 22 papers presented at a two-day conference on molecular spectroscopy held in London, February 1958, and organised by the Hydrocarbon Research Group of the Institute of Petroleum. Discussions which followed the reading of papers are also included.

As time goes on molecular spectroscopy tends to branch out in new directions and one of these branches which is rapidly increasing in importance is nuclear magnetic resonance. Three papers on this subject were presented in the first session. For the rest, the subjects dealt with included ultra-violet, infra-red and Raman spectroscopy.

After introductory remarks the n.m.r. papers were read, the first being of a general nature (R. E. Richards, F.R.S.), the second devoted to a theoretical analysis of high resolution spectra (H. Primas), and the third to practical applications in hydrocarbon analysis (R. B. Williams). Then follow papers on ultra-violet spectra and ionisation potentials of hydrocarbon molecules (W. C. Price,

F.R.S., R. Bralsford, P. V. Harris and R. G. Ridley), the shock tube as a source for studies of emission and absorption spectra (J. G. Clouston and A. G. Gaydon, F.R.S.), and the ultra-violet and infra-red absorption spectra of the methylbiphenyls (G. H. Beaven and E. A. Johnson).

The second session was mainly devoted to infra-red instrumentation with one paper on Raman intensity measurements on some simple hydrocarbons. This session was fittingly chaired by Sir Eric Rideal, F.R.S., himself a pioneer in infra-red work.

Session three was devoted to a consideration of vibrational band intensities, solvent effects, H- and metal-element bonding, and inter-molecular forces in gases. The fourth and last session dealt with the following topics: infra-red spectra of compressed gases (J. A. A. Ketelaar), infra-red spectra of adsorbed molecules (N. Sheppard), recent progress in free radical spectroscopy (G. Porter), structural analysis of hydrocarbon molecules based on their Raman spectra (M. M. Sushinskii), and applications of polarised infra-red radiation (G. R. Wilkinson, W. C. Price, F.R.S. and E. M. Bradbury). A. E. MARTIN.



DEPTH INTERVIEWS REVEAL

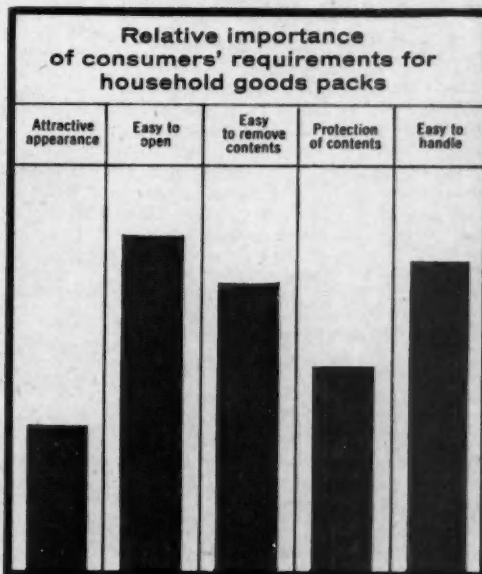
why most women prefer goods packed in GLASS

Because all sales take place in the customer's mind, what happens here is important to everyone concerned with selling household goods.

National Research into consumers' attitudes to packing reveals an overwhelming preference for glass packed goods. The principal reason for this preference is that glass hides nothing and housewives are practical. They like to know what they are buying and when it's time to buy more. Glass packing also has other strong appeals. Women *believe* in glass because it never changes the quality of the contents. Women *know from experience* that glass gives perfect protection. All these reasons combine to reveal glass as a positive factor in creating sales. It fulfills so many consumer requirements—as the graph on the right shows.

More and more, as marketing conditions change, the development of EYE-appeal and BUY-appeal packaging is becoming the joint responsibility of the glass container manufacturer and the Packer. If you would like information about glass packing, your glass container manufacturer will be pleased to help you.

See how good things are in GLASS



● **Mr. L. G. Avis, A.M.I.Mech.E., A.M.Inst.F.**, has been promoted to manager of the London and southern region of John Thompson Water Tube Boilers Co. Ltd. He joined the John Thompson organisation in 1951. The John Thompson Conveyor Co. have appointed **Mr. P. D. Hunter** as their London and southern area sales engineer responsible for all sales and services in Central London and the Home Counties.

● **Mr. D. T. Alderman**, chief engineer of Premier Colloid Mills Ltd., Hershham Trading Estate, has been appointed director and general manager of Chemical Engineering Premier Ltd., a subsidiary set-up to handle the development and sale of packaged chemical plants (see p. 279).

● **Mr. C. H. Kersey, Mr. R. F. Lewellen and Mr. C. J. Atkins** have been appointed directors of the Barter Trading Corporation Ltd., 69 Grosvenor Street, London W.1, with effect from 1 February.

● **Mr. P. S. Rendall**, who has been appointed chairman of British Celanese Ltd., is a deputy chairman and a managing director of Courtaulds Ltd. and a director of British Nylon Spinners, Snia Viscosa and other companies. He is also chairman of the Man-made Fibres Federation and vice-president of the International Rayon and Synthetic Fibres Committee. **Mr. C. F. Kearton, O.B.E.**, who has been appointed deputy chairman of British Celanese Ltd.,



P. S. Rendall



C. F. Kearton

retains his office as senior managing director. Mr. Kearton is a managing director of Courtaulds and chairman of Group Developments Ltd. and of Gossard (Holdings) Ltd. He is also a part-time member of the Atomic Energy Authority and chairman of the Electricity Supply Research Council.

● **Mr. G. V. Sims**, director of the Council of British Manufacturers of Petroleum Equipment and managing director of British Oil Equipment Credits Ltd., is leaving for the U.S. and Mexico on 19 February, to negotiate the extension of the present financing agreement with Petroleos Mexicanos (PEMEX). £2.5 million worth of firm orders have already been placed against the original financing agreement which extended credit to £3.5 million.

● **Dr. G. A. Richardson**, who as announced in CHEMICAL AGE, 6 February,

PEOPLE in the news

p. 247, has been appointed Professor of Chemical Engineering at Swansea University College, was from 1941 to 1947 research assistant on work for the Ministry of Home Security at Imperial College. From 1947 to 1958 he was lecturer, and then senior lecturer, in chemical engineering at Imperial College. He joined A. Boake, Roberts and Co. Ltd. as development chemical engineer in 1958.

● **Mr. T. B. McLaren** has been appointed superintendent of the Stanlow chemical plant, Ellesmere Port, of the Shell Chemical Co. Ltd. He joined the Shell Group in September 1947, after war service and studying organic chemistry at Liverpool University. After laboratory work at the Shell Central Laboratories, Fulham, Mr. McLaren was transferred to Stanlow refinery in December 1948, where he worked on the chemical plant until 1949 when he spent some time at Shell refineries in North America. In 1951, he was made a technologist on the chemical plant at Stanlow and in 1953 became manager of the plant's solvents department. In August 1957, Mr. McLaren had a training period in Holland, working on the ammonia and nitric acid plants at Mekog, prior to taking up the post of departmental manager, nitric acid and Nitra-Shell plant at Shell Haven, a position he left to become superintendent at Stanlow.



T. B. McLaren



Dr. D. T. Lewis

● **Dr. D. T. Lewis** has been appointed Government Chemist. He succeeds **Mr. E. H. Nurse, C.B.E.**, who has been acting Government Chemist since the death of **Dr. G. M. Bennett, C.B., F.R.S.**, in 1959, and who retires on 31 March.

Dr. Lewis, who will take up his appointment on 1 April, is aged 50, has for the last seven years been senior superintendent in charge of the chemistry division at the Atomic Weapons Research Establishment, Aldermaston. He has published a number of important papers in scientific journals dealing with researches in inorganic, physical and analytical chemistry, and is the author of *Ultimate Particles of Matter*.

● **New Midlands area manager of Borax Consolidated Ltd. is Mr. G. N. Blow.** He succeeds the late **Mr. D. G. B. Sleath**. Mr. Blow has been with the company since 1953 as a local representative in the Birmingham area.

● **Sir Walter Worboys** has been appointed a director of the Associated Portland Cement Manufacturers and of the British Portland Cement Manufacturers.

● **Professor Sir Alexander Todd, F.R.S.**, Professor of Organic Chemistry, Cambridge, and chairman of the Advisory Council on Scientific Policy, is to receive an hon. D.Sc. at Leicester University on 15 July.



W. G. Oliver, sales manager of Hickson and Welch Ltd., Castleford, Yorks, for the past four years, who has now joined the board

● The C. G. Durdey Testimonial Fund has been set up to mark the retirement at the end of the last session of **Mr. C. G. Durdey**, lecture-demonstrator in the School of Chemistry, Leeds University. Mr. Durdey had spent 40 years at the university. Contributions to the fund should be sent either direct to the Westminster Bank, 14 Eldon Terrace, Leeds 2, or to the hon. treasurer, **Dr. J. W. Belton**, at the School of Chemistry.

● **Mr. R. Jolly**, formerly in charge of the Manchester area office, has now been appointed manager of the enlarged Field Engineering Division of Benson-Lehner (G.B.) Ltd., specialists in applied cybernetics, West Quay Road, Southampton.

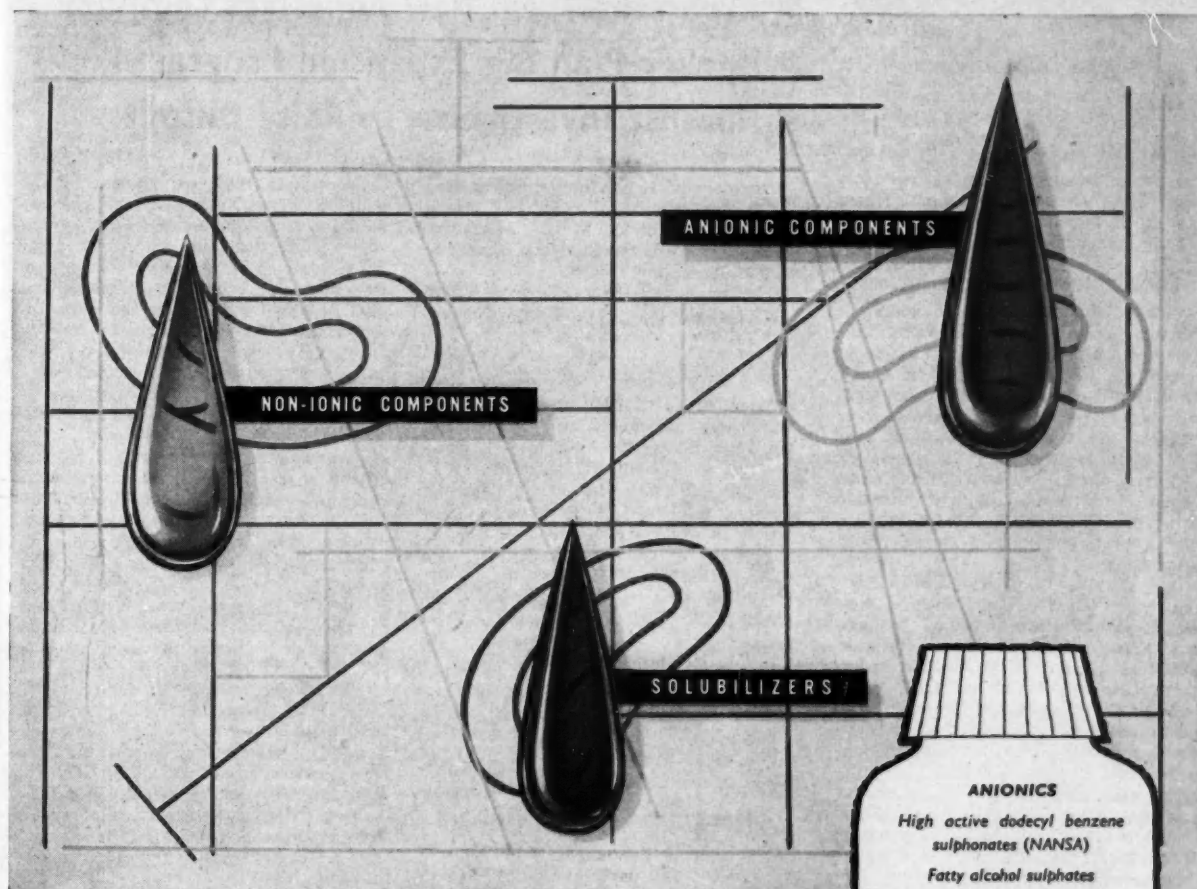
Obituary

Mr. Howard U. Cunningham, until 1957 managing director of Scottish Agricultural Industries Ltd. and a former president of the Fertiliser Manufacturers' Association, was accidentally killed on 4 February near his home at West Linton. He was riding when his horse appeared to have taken fright and thrown him, causing internal injuries from which he died. He was 63 and retired from S.A.I. in 1957 to continue his farming interests at West Linton. He became managing director of S.A.I. in 1947 and served as Fertiliser Controller to the Ministry of Supply during the Second World War.

Anionics

Non-Ionics

Solubilizers



for competitive

LIQUID detergents

For dishes . . . fine fabrics . . . hard-surface cleaning . . . the increased popularity of liquid detergents has led to keen competition, with selective formulation a key factor in winning consumer approval.

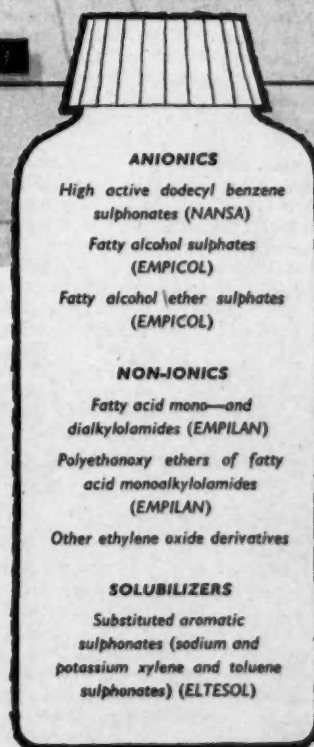
The Marchon range of components for 'liquids' gives you the choice of many formulations, each with distinct advantages in a particular field, one or more meeting *all* your requirements. Please write for technical data, with formulation advice if required.

Agents and offices in principal cities of the world.

HEAD OFFICE: Whitehaven, England. Telephone: Whitehaven 3131. Telegrams: Marchonpro, Whitehaven, Telex.
LONDON OFFICE: 140 Park Lane, London, W.1. Telephone: Mayfair 7385.

Telegrams: Marchonpro, London, Telex.

Member of the Albright & Wilson Group of Companies.



ANIONICS

High active dodecyl benzene sulphonates (NANSA)

Fatty alcohol sulphonates (EMPICOL)

Fatty alcohol ether sulphonates (EMPICOL)

NON-IONICS

Fatty acid mono—and dialkylolamides (EMPILAN)

Polyethanoxyl ethers of fatty acid monoalkylolamides (EMPILAN)

Other ethylene oxide derivatives

SOLUBILIZERS

Substituted aromatic sulphonates (sodium and potassium xylene and toluene sulphonates) (ELTESOL)

Marchon
PRODUCTS LIMITED

Marchon's products include basic raw materials and additives for every form of domestic and industrial detergent.

N.A.S. 11183

97

Commercial News

Blythe Colour Works

On capital increased by a one-for-four scrip issue, Blythe Colour Works are maintaining their final dividend at 12% for 1959, an effective rise of 2½%. The interim, prior to the capitalisation, was also 12½% as previously. Consolidated net profit increased to £174,438 from £127,297, after tax of £164,011 (£144,485).

Courtaulds/Pinchin Johnson

Courtaulds report that holders of Pinchin Johnson and Associates have accepted, or intimated their intention to accept, the offers made on their behalf by Baring Brothers and Co. to the extent of over 88% of the ordinary shares, over 89% of the first preference, and over 85% of the second preference, and that they have elected to declare all the offers unconditional, subject only to quotation being granted, not later than 26 February, for ordinary shares to be issued in exchange.

In a circular to stockholders, Courtaulds point out the significance of their merger with Pinchin Johnson. Competition in the paint industry is very keen and maintenance of profits seems to depend on further rationalisation. The associated organisation by integration and expansion, should be successful in meeting this competition. Courtaulds experience with Cellon has confirmed the company's view that it is well placed to play a major part in the paint business. It has been already decided to increase output of chemicals by expanding the petrochemical plant of British Celanese at Spondon. With experience already gained through Cellon and increased chemical output, Courtaulds have felt that a close association with a large paint company would offer substantial mutual advantages.

Of Pinchin Johnson's output, it is stated, approximately 85% is for industrial use, including 30% for the motor trade. It also has a number of subsidiaries overseas.

Elliott-Automation

Purchase of Isotope Developments by Elliott-Automation has now been completed, the necessary consents having been obtained. With the vendor company having changed its name to Nucleonic Investments, Isotope Developments have now become a wholly-owned subsidiary of Elliott-Automation and will continue their business under that name.

Expandite Adhesives

Expandite Adhesives has been formed as an Expandite subsidiary to manufacture and market a range of adhesives. The new company will develop and manufacture adhesives for special applications as required. Main emphasis, however, will be on adhesives for the building, civil engineering, metal fabrication and assembly industries.

- Pinchin Johnson Accept Courtaulds Offer
- Expandite Form New Adhesives Company
- Hooker Plan Big Expansion Programme
- Hoechst Investments to Raise Outputs

Directors of Expandite Adhesives are: T. Pooley (chairman), Mr. G. Bussey (managing director), Mr. A. Cathcart and Dr. J. Bowler Reed. The secretary is Mr. J. W. Bolton.

The company will operate from office and factory premises at St. Helens, Lancashire.

Hilger and Watts

Scientific instrument makers, Hilger and Watts, are maintaining the equivalent dividend of 15% with a 10% final for the year ended 30 September 1959. The previous final included a 2% special interim. A 1-for-5 scrip issue is proposed as well as a 1-for-4 rights issue at 21s per 5s ordinary share.

Net profit for 1958-59 was £126,575 (£112,574) while parent company's net profit is £122,798 (£111,997).

Hercules Powder

Net income of Hercules Powder Co., U.S., for 1959 is \$23.5 million, which is equal to \$2.73 a share. This compares with the 1958 total of \$17.5 million, equal to \$2.04 a share.

Monsanto Chemical (U.S.)

Net income for 1959 for Monsanto Chemical, U.S., was a record at \$48,977,000, or \$2.12 a share. This compares with \$34,550,000 or \$1.55 on fewer shares for the previous year.

Union Carbide Inc.

Net income of Union Carbide Inc., U.S. for 1959, was \$171.6 million or \$5.70 a share. This compares with \$124.9 million or \$4.15 a share the previous year. Sales at \$1,531 million are up 18%.

Hooker Chemical

Record sales and earnings were reported by Hooker Chemical Corporation for 1959. Net sales for Hooker and consolidated subsidiaries, totalled \$149,817,496, a 19.3% increase over 1958, and 16.7% higher than 1957. Net income, after provision for tax, was \$13,401,636 (\$10,639,438).

In the period 1959-1963, capital investment will call for about \$100 million for expansion of productive capacity and improvement of existing facilities, against expenditure of some \$71 million for 1954-1958. This programme includes "substantial expansion of capacity for producing not only such basic products as chlorine, caustic soda, caustic potash, phenol, phosphorus, and their derivatives, but also synthetic resins and moulding compounds, as well as new chemicals and plastics".

Progress in 1959 was marked by the addition of enlarged sodium chlorate facilities at Columbus, Miss, and expansion of the dicalcium phosphate plant at Columbia, Tenn. New phosphoric acid plants were built at Columbia and at Jeffersonville, Ind, where a new unit for manufacturing phosphates directly from by-product ferrophosphorus has just been completed. At Columbus, a new ammonium perchlorate plant for HEF, Inc., jointly owned, started operation in March.

The Bahamian corporation, Hooker Chemical International Ltd., has been set up to facilitate chemical manufacture in Latin America, and the company is negotiating with a chemical firm in Argentina for the construction of a plant in that country. Another corporation, Hooker Mexicana, S.A., was formed to manufacture and market phosphates in Mexico, with plant construction now underway.

1960 will see completion of a \$1,200,000 phosphate and phosphoric acid plant near Mexico City; implementation of signed license and purchase agreements covering installation of Hoechst-Uhde mercury chlorine-caustic cells at Niagara; construction of a new thionyl chloride plant at Niagara; initiation of engineering to increase capacity at the North Vancouver chlor-alkali plant; completion of a tetrapotassium pyrophosphate plant at Jeffersonville.

Farbwerke Hoechst AG

A report issued last week by the board of Farbwerke Hoechst AG shows that over 1959 the company recorded a total turnover of DM2,222 million (£185.2 million), an increase of 17.6% over 1958. Over the previous year Hoechst's increase in home sales was one of DM200 million (some £16.7 million), or 15.2%. Export sales rose to a 1959 total of DM720 million (over £60 million), or 22.9% higher than in 1958. Most of the increased export turnover came from purchases by other European countries. Exports now account for 32.4% of the company's total turnover. Since increased general demand has brought about supply difficulties in some spheres, the stress of future investment plans must be the raising of present capacities, state Hoechst.

A good year was noted for the inorganics field, the phosphorus chemical of the Knapsack-Griesheim subsidiary recording particular success. Demand for chlorine is very high and the future must see an increase in Hoechst chlorine output capacity. More fertilisers were sold than in 1958.

Both old and new products in the field of plastics and solvents developed well over 1959, polyvinyl acetate, polythene

Braby

 (REGD.)

STEEL DRUMS

Our 'D', 'DSC' and 'DRT' type drums (pitch B flat) have a wide range of uses. Although nominally non-returnable, with reasonable handling they will serve as returnable containers. The 'A', 'E' and 'XRT' types, being made from heavy gauge steel, provide only a dull thud, but being returnable (and therefore chargeable) are of more use to industry than to music.



FREDERICK *Braby* & COMPANY LIMITED

LONDON: 352-364 Euston Road, London, N.W.1
Telephone: EUSlon 3456

LIVERPOOL: Havelock Works, Aintree, Liverpool, 10
Telephone: Aintree 1721

CRAYFORD • GLASGOW • BRISTOL • BELFAST • PLYMOUTH

AP163

and polypropylene types all showing better results. High-temperature pyrolysis is now being used and in the future will guarantee good quantities of acetylene and ethylene for raw material purposes.

Due to increased demand, plant is to be installed to raise polymerisation capacity for Hostalen polythene and polypropylene.

Research costs in 1959 amounted to DM100 million (or some £8,340,000), or 4.5% of turnover. Plant and installation investment over the year totalled some DM252 million, or about £21 million,

and for the current year is expected to reach DM330 million, or over £27.5 million.

Ruhr-Schwefelsäure GmbH

In yet another absorption move in the West Germany chemical industry, the Bochum sulphuric acid specialists Ruhr-Schwefelsäure GmbH have officially taken over their two chemical subsidiaries, Chemische Fabrik Curtius GmbH, Duisburg, and Chemische Industrie GmbH, Bochum.

TRADE NOTES

Chemstrand Scottish Office

Expansion in the sale of Acrilan to Scottish and border country manufacturers has led to the setting up on 15 February of an area office in Scotland at 38 Bath Street, Glasgow C.2. (Douglas 5252).

A. and W. Product List

List of products of the general chemicals department of Albright and Wilson (Mfg.) Ltd., 1 Knightsbridge Green, London W.1, is now available in a revised form. Also published is a review of the company's general activities, its history and the scope of present activities.

Simazine for Weed Control

Simazine is being made available by Fisons Pest Control Ltd. as a selective weedkiller for controlling both broad-leaved and grassy annual weeds in apples, pears, bush and cane fruit, asparagus and maize. The product, based on a 50% formulation of Geigy simazine, is a reliable and persistent weedkiller giving at recommended dosage rates, freedom from weeds for several months. Simazine will be distributed

throughout the U.K. by Fisons Pest Control and the Murphy Chemical Co. Ltd., under the trade name Guesatop, and by the Shell Chemical Co. Ltd. under the name Bladex.

B.K.L. Reference Manual

B.K.L. Alloys Ltd., Kings Norton, Birmingham 30, have introduced a new comprehensive manual, B.K.L. Tubend Welding Fittings, which comprises a specification of all their elbows, return bends, equal tees, reducing tees, concentric and eccentric reducers and caps. Tables which give comparisons between British and U.S. standards. A further section gives information on materials suitable for low temperature service.

Dialdehyde Starch

Further details on dialdehyde starch manufactured by the Miles Chemical Co., Division of Miles Laboratories Inc., U.S., referred to in CHEMICAL AGE, 23 January, p. 160, are available from the associated U.K. company, Miles Laboratories Ltd., Nuffield House, 41-46 Piccadilly, London W.1. Miles Laboratories, who represent the Miles Chemical Co. in Europe, have available technical information and samples.

Market Reports

SUSTAINED DEMAND FOR HOME MARKET

LONDON Home trade demand for industrial chemicals has been sustained both as regards contract deliveries and new business, and reports indicate that the export movement continues on a satisfactory scale. The bases prices for white lead have been reduced by 50s per ton, and for red lead and litharge by 55s per ton, from 6 February. In other sections of the market prices are steady.

There has been a good call for supplies of hydrogen peroxide, borax, boric acid and formaldehyde, while among the soda products there has been an active demand for chlorate of soda and bichromate of soda.

Fertiliser demand is still only moderate. There is a good outlet for most of the coal tar products, with naphthalene supplies readily absorbed.

MANCHESTER The movement into consumption in the Lancashire and West Riding areas of most descriptions of chemical products, including both

light and heavy, gives little ground for complaint on the Manchester market. Contracts are being drawn against steadily and a fair number of new inquiries have been in circulation. Export business is on a satisfactory scale. The seasonal demand for fertiliser materials has been rather more in evidence. For most of the tar products, including carbolic and cresylic acids and creosote oil, the call has been fairly active.

SCOTLAND Business during the past week in the Scottish heavy chemical market has again been reasonably maintained. In particular textile chemicals have featured well, as have those for paper manufacture. Quantities demanded have also been maintained at a good level both in regard to spot and contract requirements. No material changes in prices have taken place and mostly have remained firm except those relating to metal derivatives. An active position prevails in the export market with a steady volume of enquiries.

DIARY DATES

MONDAY 15 FEBRUARY

C.S. with R.I.C.—Leeds: Chemistry Lecture Theatre, University, 6.30 p.m. 'Some aspects of structural chemistry of platinum', by Prof. E. G. Cox.
C.S.—Manchester: College of Science, 6.30 p.m. 'Rotational isomerism in organic nitrites', by Dr. P. Gray.
S.C.I.—London: 14 Belgrave Sq., S.W.1, 5.30 p.m. 'Mode of action of dipyrilidyl watery salts as herbicides', by Dr. R. F. Homer.

TUESDAY 16 FEBRUARY

I.Chem.E.—Manchester: Chemical Engineering Building, Jackson St., 6.30 p.m. 'Correlation of absorption rates of carbon dioxide by alkaline and amine solutions', by Dr. J. E. Ellis.
Soc. for Visiting Scientists.—London: 5 Old Burlington St., W.1, 7.30 p.m. Discussion meeting on 'Radioactive fall-out'.

WEDNESDAY 17 FEBRUARY

C.S. with R.I.C.—Newcastle upon Tyne: Chemistry Dept., King's College, 6 p.m. 'Why polymerisation occurs', by Prof. F. S. Dainton.
C.S.—Glasgow: Chemistry Dept., University, 4 p.m. Centenary lecture: 'Some glimpses into the variations which nature brings about in acetylenic compounds', by Prof. N. A. Sørensen, followed by a.g.m.
Plastics Inst.—Edinburgh: North British Hotel, 7.30 p.m. 'Plastics and rubber in the U.S.', by G. H. Madge.
Plastics Inst.—Gloucester: Technical College, 7 p.m. 'Recent developments in materials', by C. W. Welch.
Plastics Inst.—Newcastle upon Tyne: Eldon Grill, Grey St., 7 p.m. 'Melamine resins', by Formica Ltd.
R.I.C. with S.C.I.—Manchester: Main Chemistry Lecture Theatre, University, 2 p.m. Symposium on 'Chemical product development', papers by Prof. B. R. Williams, Dr. E. Hoggarth and J. Willcock.
R.I.C.—London: King's College, Strand, W.C.2, 6 p.m. 'Rocket propellants', by Dr. W. G. S. Parker.
S.C.I.—London: 14 Belgrave Sq., S.W.1, 6 p.m. 'Adsorption on electrodes and its relation to rates of electrode processes', by Dr. R. Parsons.

THURSDAY 18 FEBRUARY

C.S. with R.I.C. and S.C.I.—Edinburgh: North British Station Hotel, 7.30 p.m. 'Concept of food science', by Prof. J. Hawthorn.
C.S. with R.I.C. and S.C.I.—Gloucester: Technical College, Brunswick Rd., 7.30 p.m. 'Chemotherapeutic research', by Dr. F. L. Rose.
C.S.—Bristol: Dept. of Chemistry, University, 5.15 p.m. 'Biogenesis of porphyrins', by Prof. A. W. Johnson.
Inst. Plant Eng.—Blackburn: Castle Hotel, 7.30 p.m. 'Some experiences with chemical engineering plant', by J. C. Veale.
S.A.C.—Birmingham: 2.30 p.m. Symposium on 'Food analysis'.

FRIDAY 19 FEBRUARY

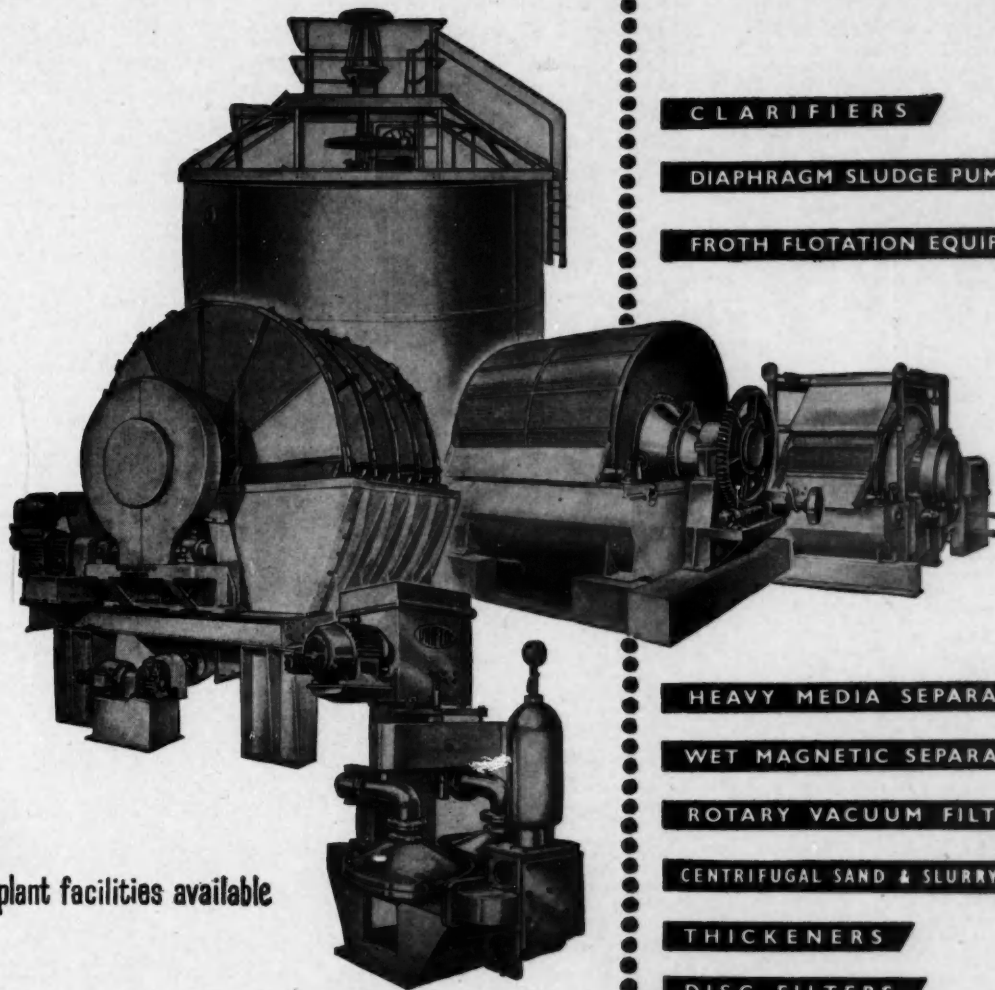
C.S.—Aberdeen: University Union, 8 p.m. Centenary Lecture: 'Some glimpses into the variations which nature brings about in acetylenic compounds', by Prof. N. A. Sørensen.
C.S.—Cambridge: University Chemical Lab., Lensfield Rd., 8.30 p.m. 'Electron resonance studies of unstable radicals', by Dr. D. J. E. Ingram.
Plastics Inst.—Birmingham: James Watt Memorial Inst., Gt. Charles St., 6.30 p.m. 'Polyacetal resin', by Du Pont Co. (U.K.) Ltd.
S.A.C.—London: Postgraduate Medical School, Ducane Rd., W.12, 6 p.m. A.g.m. Microchemistry Group, followed by 'Micro-methods in clinical biochemistry', by Prof. E. J. King.
S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Organic chemistry of colour photography', by Dr. E. B. Knott.
S.C.I.—Plymouth: Technical College, 5.30 p.m. 'Chemical aspects of soil fertility', by Dr. G. W. Cooke.
Soc. Dyers and Colourists.—Manchester: Textile Inst., 10 Blackfriars St., 7 p.m. 'Biological chemistry of cellulose', by Dr. J. A. Gascoigne.

Non-pneumatic Motor Tyres by 1961?

Motorists may by next year return to driving on 'solid' tyres, according to a development engineer of Courtaulds (Canada) Ltd. Apparently experiments are being carried out with tyres filled with a rigid foam plastics material.

A report from the same source also mentions the introduction of tyres with replaceable treads, scheduled to appear in the immediate future.

Plant for wet material handling



CLARIFIERS

DIAPHRAGM SLUDGE PUMPS

FROTH FLOTATION EQUIPMENT

HEAVY MEDIA SEPARATORS

WET MAGNETIC SEPARATORS

ROTARY VACUUM FILTERS

CENTRIFUGAL SAND & SLURRY PUMPS

THICKENERS

DISC FILTERS



Test plant facilities available

unifloc plant

UNIFLOC LIMITED, 2-3, ST. MARY STREET, SWANSEA • TELEPHONE 55164

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 16 March

Novel silanes and organosiloxane polymers and processes for preparing same. Velsicol Chemical Corp. 761 585
Antimony phosphate. Associated Lead Manufacturers Ltd. 792 997

ACCEPTANCES

Open to public inspection 23 March

Phosphorus-containing keto-esters. Union Carbide Corp. 831 149
Fungicidal compositions and their use. Geigy AG, J. R. 830 902
Chlorination of polymers. T.I. (Group Services) Ltd. 831 150
Production of regenerated cellulose from viscose. Du Pont De Nemours & Co., E.I. 831 001
Recovering monomers from hot latex emulsions. Phillips Petroleum Co. 830 082
Esters of N-alkyl-p-aminosalicylic acids. Ciba Ltd. 830 936
Para-aminobenzoates of ethinyl carbinols. Orosnik, W., and Karmas, G. 830 905
Polymerisation process for olefins. Phillips Petroleum Co. 831 009
Recovery of acetylene from gases. Phillips Petroleum Co. 831 261
Preparation of granular polymers of vinyl chloride. Goodrich Co., B. F. 830 939
Recovery and purification of acetylenes. Phillips Petroleum Co. 831 262
Production of cellulose derivatives from viscose. Courtaulds Ltd. 830 062
Esters and functional fluids containing same. Monsanto Chemical Co. 830 906
Production of derivatives of phenothiazine-10-carboxylic acid esters and their decarboxylation products and esters of 3-halogen-phenothiazine-N-carboxylic acids with amino alcohols. Badische Anilin- & Soda-Fabrik AG. 831 091
Zirconium alloys. U.K. Atomic Energy Authority. 831 202
Thermoplastic polymeric products and preparation thereof. Rohm & Haas Co. 830 785
Aqueous dispersions of polymers. Lonza Electric & Chemical Works Ltd. 831 204
Film evaporators for liquids. Farbenfabriken Bayer AG. 830 940
Synthetic fibres. Du Pont De Nemours & Co., E.I. 830 910
Dimerisation process. Ethyl Corp. 830 942
Ion-exchange processes and apparatus. Permutit Co. Ltd., and Porter, R. R. 831 206
Catalytic reforming of petroleum hydrocarbons. British Petroleum Co. Ltd., Moy, J. A. E., and Burbridge, B. W. 830 789
Catalytic reforming of hydrocarbons. British Petroleum Co. Ltd., Moy, J. A. E., and Leather, J. 830 790
Cyanacetylhydrazide derivatives and compositions containing them. Imperial Chemical Industries Ltd. 831 096
Viscosity increase of melts of linear polyesters or polyamides. Farbenfabriken Bayer AG. 830 823 & 831 207
Process and catalyst for polymerisation of polymerisable hydrocarbons. Phillips Petroleum Co. 830 824
Purification of Aphalosporin N. Imperial Chemical Industries Ltd. 831 208
Di-quaternary compounds. Wellcome Foundation Ltd. 830 825
Emulsifiable rust preventive concentrate. Esso Research & Engineering Co. 831 046
Unsaturated polyesters and process for preparing same. Rütgerwerke AG. 830 794

Polymer compositions. Imperial Chemical Industries Ltd. 830 827
Polyacrylonitrile solutions. Courtaulds Ltd. [Addition to 796 294.] 831 049
Production of mixed fertilisers containing nitrogen, calcium and phosphate. Stamicarbon N.V. 830 829
Quinolones and therapeutic compositions containing them. Imperial Chemical Industries Ltd. 830 832
Preparing thermoplastic polymers. American Cyanamid Co. [Addition to 738 473.] 830 947
Production of α -chloro acrylic acid alkyl esters. Badische Anilin- & Soda-Fabrik AG. 831 050
Production of polychlorobenzene compounds. Heyden Newport Chemical Corp. 831 051
Process for concentrating aqueous acrylic acid. Deutsche Solvay-Werke GmbH. 831 052
Recovery of tetracycline. American Cyanamid Co. 830 795
Extraction of materials from solid bodies. Glincka, C. 830 948
Preparing chlorophenolaldehyde resins and resulting products. Olin Mathieson Chemical Corp. 831 053
Method of producing dicyclopentadienylmagnesium. American Cyanamid Co. 831 213
Dehydration of substances. Farbenfabriken Bayer AG. 831 215
Manufacture of pure silicon. Standard Telephones & Cables Ltd. 831 216
Polyacrylonitrile solutions. Courtaulds Ltd. [Addition to 796 294.] 830 830
Regeneration of water-softening materials. British Petroleum Co. Ltd. 830 796
Polymerisation of olefins. Esso Research & Engineering Co. 830 831
Production of water-soluble acids having a dissociation constant of less than $10^{-2.5}$ from their sparingly soluble salts. Chemische Fabrik Budenheim AG. 831 055
Iron oxide reduction. Freeman, H. 831 006
Polymerisation catalysts and process for the production of polymers. Badische Anilin- & Soda-Fabrik AG. 830 834
Preparation of synthetic fibre-forming polyamides and polyamides prepared thereby. Agency of Industrial Science & Technology, Ministry of International Trade & Industry of the Government of Japan. 830 799
Amidophosphoric acid derivatives. Farbenfabriken Bayer AG. 830 800
Preparation of hydroxyl-containing polymers. Devos & Raynolds Co. Inc. 831 056
Adhesives. Deutsche Gold- und Silberscheidanstalt Vorm. Roessler. 830 835
Disulphonamides and compositions containing them. Merck & Co. Inc. 830 821
Reforming catalysts. Engelhard Industries Inc., formerly Baker & Co. Inc. 830 838
1-(2-benzylaminoethyl) naphthalene and acid addition salts thereof, and pharmaceutical preparations of the penicillin salt. Wellcome Foundation Ltd. 830 913
Protecting elastomers against atmospheric degradation. Etablissements Kuhlmann. 830 914
Purification of terephthalic acid. Imperial Chemical Industries Ltd. 830 801
Method of and apparatus for purifying or washing air or other gases. Drummond Patents Ltd. [Addition to 735 369.] 830 803
Olefin polymerisation process and catalyst therefor. National Distillers & Chemical Corp. 831 160
Process for the production of high octane gasoline. California Research Corp. 830 806
Storage of liquefied gases. British Oxygen Co. Ltd. 831 231
Conditioning method for the dyeability of wet spun and stretched fibres from polymers and copolymers of acrylonitrile. Dow Chemical Co. 830 986
N-alkyl monothiooxamides. American Cyanamid Co. 831 001
Aminoguanidine derivatives and their preparation. Imperial Chemical Industries Ltd. 830 916
Polyvinyl chloride compositions. Imperial Chemical Industries Ltd. 830 810
Method for the preparation of phosphoric acid di-alkyl ester amides. Benckiser GmbH., Chemische Fabrik, J. A. 830 918
Water-soluble azophthalocyanine dyestuffs. Farbenfabriken Bayer AG. 830 920
Triazine derivatives. Vitamins Ltd. 831 252
High strength synthetic linear polyamides. Du Pont De Nemours & Co., E. I. 830 757

Apparatus for treating reactive synthetic plastics. Lechler, P., and Lechler, K. [trading as Lechler O.H.G., P. [Firm off]]. 831 019
Organosilicon compositions. Midland Silicones Ltd. 831 020
Transport of liquid explosive nitric esters. Imperial Chemical Industries Ltd. 830 843
Continuous method for the manufacture of solid esters. General Aniline & Film Corporation. 830 761
Finely crystalline pigment dyestuffs of the diazine series. Geigy AG., J. R. 831 243
Quinoline derivatives and their preparation. Imperial Chemical Industries Ltd. 830 844
Preparation of steroid compounds. Pfizer & Co. Inc., C. 831 256
Erythromycin esters of dicarboxylic acids. Abbott Laboratories. 830 846
Water-soluble colouring matters containing N-substituted sulphonamide group. Imperial Chemical Industries Ltd. 830 847
Production of alkoxymethyl acetates. Distillers Co. Ltd. 830 850
Stable irradiated polyethylene. General Electric Co. 831 257
Alkyd resins. Bergwerksverband GmbH. 830 812
Polyolefin resins and process for preparation. Union Carbide Corp. 831 260
Removal of water from aqueous ethylene diamine. Dow Chemical Co. 831 025
Production of triacetone dialcohol. Distillers Co. Ltd. 830 813
Purification of metallic indium. Du Pont de Nemours & Co., E. I. 831 173
Process of preparing a compound fertiliser, containing nitrate of ammonia and dicalcium phosphate, from sedimentary phosphates. Stamicarbon N.V. 830 815
Spinning solutions of polyacrylonitrile. Farbenfabriken Bayer AG. 830 817
Antiallergic composition. Laboratoire de Recherches Biologiques Laborec. 830 819
Process for viscose production. Du Pont de Nemours & Co., E. I. 830 820
Production of oxidation dyes or prints. Farbenfabriken Bayer AG. 830 851
Amino-alkyl aryl ethers. Farbenfabriken Bayer, AG. 830 857
Coating compositions. Du Pont de Nemours & Co., E. I. 831 042
Sulphonyl carbamides. Boehringer & Soehne GmbH, C. F. 831 043
Production of aliphatic nitriles. Union Carbide Corp. 830 862
Detergent compositions. Shell Research Ltd. 830 864
Manufacture of tetrahydrofurfuryl-ammonium compounds. Hoffmann-La Roche & Co., AG, F. 830 866
Production of transparent synthetic linear polyamide filaments. Farbenfabriken Bayer AG. 830 867
Compositions for treating animals to eliminate hookworms and ascarids. American Cyanamid Co. 830 868
Producing amino-borines. Kali-Chemie AG. 830 768
Preparation of β -piperidinoethyl- α -phenyl- α -piperidine-acetate and its dihydrochloride. Laboratoires Dausse. 830 869
Distillation of heat sensitive compounds. Phillips Petroleum Co. 830 772
Antibiotic mitomycin C and its production by fermentation. Kyowa Hakko Kogyo Kabushiki Kaisha, and Kitasato Kenkyusho, Shadan Hojin. 830 874
Anti-foaming agents for non-ionic surface-active compounds for their solutions. Henkel & Cie, GmbH. 830 875
Acid anthraquinone dyestuffs. Badische Anilin- & Soda-Fabrik AG. 830 876
Sulphathiodiazoles. Farbenfabriken Bayer AG. 831 032
Manufacture of resorcinol. Triggs, W. W. (Good-year Tire & Rubber Co.). 830 877
Stabilised halogen-containing vinyl resin. Ferro Chemical Corp. 831 033
Unsaturated polyesters. United States Rubber Co. [Addition to 786 926.] 831 034
Phosphoric acid esters. Boehringer, A., Boehringer, E., Liebrecht, I., Liebrecht, J., and Mayer-List, W. [trading as Boehringer Sohn, C. H.]. 830 774
Bactericidal detergent compositions. General Mills Inc. 830 880
Production of hydrogen peroxide. Du Pont de Nemours & Co., E. I. 831 036
Isomerisation of n-paraffinic hydrocarbons and catalysts therefor. Engelhard Industries Inc. 830 882
Production of synthesis gas rich in hydrogen. Power-Gas Corp. [Divided out of 831 263.] 831 264

CLASSIFIED ADVERTISEMENTS

CLASSIFIED RATES: All sections 5d. per word. Minimum 8/-. Three or more insertions 4d. per word. Box Number 2/- extra. Up to 10 a.m. Tuesday for insertion same week.

SEMI-DISPLAY: 30/- per inch. Three or more insertions 25/- per inch.

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE, Horticultural burning, filtering, disinfecting, medicinal. Also lumps, ground and granulated. **THOMAS HILL-JONES, INVICTA WORKS, BOW COMMON LANE, LONDON, E.3 (TELEPHONE: EAST 3285).**

MISCELLANEOUS

15 Miles Windscale. Riding (Arabs and ponies) on remote hills, beaches. Expert tuition. Residential. Williamson, "Summer Hill," Silecroft, Cumberland. Millom 560.

PLANT AND MACHINERY FOR SALE

By Order of the Secretary of State for War

SALE BY TENDER

Two OLEUM Plants, each with a capacity of 70,000 lb. of SO₂ per day from crude sulphur as 22 per cent Oleum, together with auxiliary plant, to be sold as separate lots.

Location: Girvan, Ayrshire.

Tenders must be submitted by 10 March, 1960.

Application for Tender Forms should be made to

**WAR OFFICE, DIRECTORATE OF DISPOSALS, D.3(b)
FIRST AVENUE HOUSE,
HIGH HOLBORN, LONDON, W.C.1.**

ONE HUNDRED gallon Mild Steel Water Jacketed Enclosed Mixing PAN 3 ft. by 3 ft. 6 in. Bottom Outlet or can Tilt. In very nice condition. Lying Willow Tree Works, Swallowfield, Berkshire. Apply Winkworth Machinery Limited, 65 High Street, Staines, Middlesex. Telephone: Staines 55951/3.

Mild Steel Vertical Jacketed Pan, 48 in. I.D. by 54 in. deep, heavy domed cover plate 2 in. thick slotted for 1½ in. Lock Bolts. Suitable for Vulcanising, Tested Hydraulic 100 lb. PSI. Price £120 0s. 0d. Ex stores.

**THOMPSON & SON (MILLWALL) LTD.,
MILLWALL, LONDON, E.14. Tel.: East 1844**

PLANT AND MACHINERY FOR SALE: continued

PHONE 55298 STAINES

S.S. (Unused) Mixer 5 ft. by 2 ft. 6 in. by 2 ft. 9 in. deep.
(60) 'U' Trough Mixers up to 9 ft. 6 in. by 4 ft. by 4 ft.
(15) 'Z' & Fin Mixers up to 4 ft. 6 in. by 3 ft. 6 in. by 3 ft.
Spiked Roll Crushers 36 in. by 6 in. 16 in. by 12 in. and 12 in. by 3 in.
Twin Roll Dryers 66 in. by 32 in. and 40 in. by 32 in.
Disintegrators 0, 1½, 2½, and 3½ sizes.
Alum. Cyl. Enc. Tanks 1,000 and 2,000 galls.
Glass Lined Tanks 360 up to 10,000 galls.
S.S. Tanks 750, 425, 200 and 30 galls.

Send for Lists

**HARRY H. GARDAM & CO. LTD.,
100, CHURCH STREET, STAINES**

Three Lead lined **STEEL TANKS**, 14,000 galls., 9 ft. diam. by 35 ft. long.

Three Lead lined **STEEL TANKS**, 9,500 galls., 13 ft. 6 in. diam. by 10 ft. high.

Two **NICKEL SILVER TANKS**, 6,750 galls., 8 ft. diam. by 23 ft. 3 in.

Brand New **COCHRAN** Vertical and **ECONOMIC** Self-contained **STEAM BOILERS** in stock, also all sizes reconditioned and guaranteed. List on request.

STAINLESS STEEL TANKS, PANS, CONDENSERS, PLATES VALVES AND COCKS. Very wide selection.

**FRED WATKINS (ENGINEERING) LTD.,
COLEFORD, GLOS.**

Phone: Coleford 2271/2.

SCIENTIFIC SERVICES

SILICA CONES AND SOCKETS, SILICA TUBING, POLISHED SILICA DISCS AND GLAZED SHEET ex-stock from: **Jencons (Scientific) Ltd., Mark Road, Hemel Hempstead, Hertfordshire. Boxmoor 4641.**

SITUATIONS VACANT

ORGANIC CHEMIST

required by British-American Tobacco Company's Research and Development Establishment at Southampton for one of its expanding research groups. Candidates should possess a good Honours degree and research experience in determining the composition and structure of natural polysaccharides and like materials.

Apply in writing, stating age and experience to:

**Personnel Dept. (No. 10),
British-American Tobacco Co. Ltd.,
Westminster House, 7, Millbank, London, S.W.1.**

SITUATIONS VACANT: continued

**BAKELITE LIMITED**

ARE EXTENDING THEIR

**TECHNICAL
STAFF**

AND WISH TO ENGAGE

**SEVERAL
QUALIFIED
CHEMISTS****A
CHEMICAL
ENGINEER****A
PHYSICIST****A
MECHANICAL
ENGINEER**

APPLICATIONS GIVING AGE, QUALIFICATIONS AND
EXPERIENCE, AND INDICATING PREFERENCE FOR
A PARTICULAR POST SHOULD BE ADDRESSED TO—

PERSONNEL MANAGER

BAKELITE LIMITED

TYSELEY, BIRMINGHAM 11

QUOTING REFERENCE CA/4

BOX NUMBERS:

Reply c/o "Chemical Age"
Bouverie House Fleet Street EC4.

SITUATIONS VACANT: continued

A small chemical manufacturing company, South Midlands, wishes to engage a chemist to carry out research on processes and products and generally assist management in new developments. Preferred age 25-30. Please write, with details of experience, qualifications and salary to: **Box No. 3694, Chemical Age.**

ATOMIC ENERGY ESTABLISHMENT, WINFRITH, DORSET

requires

EXPERIMENTALISTS

to provide a chemical service to reactor experiments and to assist in the commissioning of chemical plant associated with reactors and engineering experiments and their subsequent chemical control. There are opportunities to gain experience in an extensive field of chemical applications in the atomic energy industry.

Minimum qualifications is G.C.E. in five subjects, including English Language, at 'O' level with two scientific or mathematics subjects at 'A' level, one preferably in chemistry, or equivalent qualifications. Possession of H.N.C. Chemistry and experience in the determination of trace elements would be an advantage.

Salary (male) according to age and experience in the range £420 (at age 18) £1,285 p.a.

Housing and superannuation scheme.

Send POST CARD for application form to: **Personnel Branch (W230/38), U.K.A.E.A., A.E.E., Winfrith, Dorchester, Dorset, not later than 5th March, 1960.**

EXPANDING Anglo-American Company requires good all-round qualified analyst for new laboratory sited in East Anglia. Age preferably under 30. Interesting work involving use of established American methods. Good prospects. Pension scheme. Write full details (which will be treated in strict confidence) of experience and salary required to: **Chief Chemist, Box No. 3695, Chemical Age.**

IMPERIAL CHEMICAL INDUSTRIES LIMITED requires for its Industrial Hygiene Research Laboratories at the Frythe, Welwyn, Herts., a woman information officer (preferably under 30 years of age) to assist in maintaining an index of chemical and medical information and a correspondence registry. Applicants should be graduates in Chemistry, or have a chemical background, and should possess at least a working knowledge of French and German and have a liking for abstracting and classification. Apply in writing, giving particulars of qualifications and experience, to the: **Staff Officer (Women), Imperial Chemical House, Millbank, London, S.W.1.**

PRINCIPAL SCIENTIFIC OFFICER: DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH. Pensionable post at Warren Spring Laboratory, Stevenage, Herts. for man or woman to lead a team in research in chemical engineering. Qualifications: normally first or second class honours degree in chemistry, physics or chemical engineering, or high professional attainment. Research experience in the field of chemical engineering together with a sound knowledge of basic principles and theory, and an interest in basic research work essential. Salary scale (men) £1,420—£2,020. Starting pay may be above minimum. Write Civil Service Commission, 17 North Audley Street, London, W.1. for application form, quoting S/5098/60/9. Closing date 9th March, 1960.

WORK WANTED AND OFFERED

**CRUSHING, GRINDING, MIXING and DRYING for the trade.
THE CRACK PULVERISING MILLS LTD.**

Plantation House,
Mincing Lane,
London, E.C.2.

THE WORLD'S GREATEST BOOKSHOP

FOYLES
FOR BOOKS

Technical Books

119-125 CHARING CROSS ROAD, LONDON, W.C.2
Gerrard 5660 (20 lines) * Open 9-6 (inc. Sat.)
Nearest Station: Tottenham Court Road

Chemical Age Enquiry Service

For fuller details of equipment, apparatus, chemicals etc., in the advertisement or editorial pages of Chemical Age, fill in the coupons below, ONE PER ENQUIRY, and return to us.

Please send further details about

.....

.....

mentioned on page.....of this issue.

Name..... Position.....

Firm.....

Address

.....

Chemical Age Enquiry Service.

Please send further details about

.....

.....

mentioned on page.....of this issue.

Name..... Position.....

Firm.....

Address

.....

Chemical Age Enquiry Service.

Please send further details about

.....

.....

mentioned on page.....of this issue.

Name..... Position.....

Firm.....

Address

.....

Chemical Age Enquiry Service.

★ Detach this page complete then fold as marked overleaf to use the post-paid reply folder

CUT ALONG THIS DOTTED LINE

2nd FOLD

Postage will be paid by the Licensee

No Postage Stamp necessary if posted in Great Britain or Northern Ireland

BUSINESS REPLY FOLDER
Licence No. 2501

CHEMICAL AGE
154-160 FLEET STREET
LONDON, E.C.4

3rd FOLD

1st FOLD

Chemical Age

ENQUIRY SERVICE



☞ This is a special service for readers of

CHEMICAL AGE

☞ It is designed to give fuller information on equipment, apparatus, chemicals etc., mentioned in this issue—whether in the editorial text or in an advertisement

☞ Cut out the whole of this page, fold as instructed with post-paid address on the outside



Chemical Age

154 Fleet Street, London, E.C.4
Tel.: Fleet Street 3212

ULTRASORB ACTIVATED CARBON

ULTRASORB Carbons are available for recovery of most industrial solvents, benzole extraction, water purification and other gas and liquid phase applications.

BRITISH CARBO NORIT UNION LIMITED

LONDON ROAD, WEST THURROCK, GRAYS, ESSEX

Cables: 'Bricarbun Grays'

Tel.: Grays Thurrock 4845

CARBO-UNION-WHESSOE

Activated Carbon Recovery Plant for the purification of gases and the recovery of vapour phase solvents.

Whessoe Ltd : Darlington : Co. Durham

Cables: Whessoe Darlington Tel.: Darlington 5315

London Office: 25 VICTORIA STREET, S.W.1

ABBay 3881



WORLD FAMOUS FRACTIONAL HORSE-POWER GEARED MOTORS

Output-shaft has 12 positions.
Integral Wormgear Reduction
Ventilated—Drip Proof.
Vacuum Impregnated Windings.
Dynamically balanced Armatures and Rotors.



SERIES WOUND GEARED MOTOR—Type 'K'

R.P.M. - TORQUE	R.P.M. - TORQUE
600 10 oz. in.	37.5 4 lb. in.
300 16 oz. in.	25 4 lb. in.
150 24 oz. in.	18.8 4 lb. in.
100 32 oz. in.	12.5 4 lb. in.
75 36 oz. in.	9.4 4 lb. in.
50 3 lb. in.	6.25 4 lb. in.

SHADED-POLE INDUCTION GEARED MOTOR—Type 'FA'

R.P.M. - TORQUE	R.P.M. - TORQUE
216 4 oz. in.	13.5 24 oz. in.
108 7 oz. in.	9 30 oz. in.
54 10 oz. in.	6.7 35 oz. in.
36 12 oz. in.	4.5 44 oz. in.
27 15 oz. in.	3.35 3 lb. in.
18 20 oz. in.	2.25 4 lb. in.

VARIABLE SPEED GEARED MOTOR—Type 'KQ'

R.P.M. - TORQUE	R.P.M. - TORQUE
200-600 9 oz. in.	12-37.5 4 lb. in.
100-300 16 oz. in.	8-22 4 lb. in.
50-150 20 oz. in.	6-16.5 4 lb. in.
32-100 32 oz. in.	4-11 4 lb. in.
25-75 40 oz. in.	3-8.25 4 lb. in.
16-50 48 oz. in.	2-5.5 4 lb. in.

CAPACITOR INDUCTION GEARED MOTOR—Type 'N'

R.P.M. - TORQUE	R.P.M. - TORQUE
456 8 oz. in.	28.5 3 lb. in.
228 13 oz. in.	19 4 lb. in.
114 21 oz. in.	14.2 4 lb. in.
76 26 oz. in.	9.5 4 lb. in.
57 32 oz. in.	7.1 4 lb. in.
38 44 oz. in.	4.75 4 lb. in.

CITENCO LIMITED

(Dept. CA58)

MANOR WAY · BOREHAM WOOD · HERTS · ENGLAND

Telegrams: Citenco Borehamwood. Telephone: Elstree 3666-7-8

CROMIL & PIERCY LTD.



GRAPHITE
IN ALL FORMS

MILBURN HOUSE

"E" FLOOR

NEWCASTLE-ON-TYNE

Tel: 2-7761

*....make your product
sell itself....*



Rheemcote

..... Steel Containers
can be lithographed
with your own design in
any number of colours.

Enquiries to:...

RHEEM LYSAGHT LIMITED
ST. VINCENT'S WORKS, BRISTOL, 2
TELEPHONE BRISTOL 77601 : TELEGRAMS LYSAGHT BRISTOL

